The Impact of Firm Size and Industry on Director Dealing Profitability: Evidence from the Johannesburg Stock Exchange

Author:

Delano Gallagher, University of Cape Town, South Africa

Supervisor:

Francois Toerien

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Abstract

The purpose of this study is to investigate whether abnormal returns are earned on insider trading on the Johannesburg Stock Exchange (JSE). The study first tests the strong form of the Efficient Market Hypothesis by investigating whether abnormal returns are earned by directors purchasing or selling their own firms' shares, and thereafter the semi-strong form of the Efficient Market Hypothesis by investigating the occurrence of abnormal returns earned by outsiders mimicking these director transactions once they are publically announced (which has to be within 48 hours). In addition, this study tests whether these abnormal returns are dependent on firm size, and secondly whether a firm's industry classification, as defined by the JSE, has an effect on the magnitude of abnormal returns earned by directors and outsiders mimicking these transactions. Event study methodology, in conjunction with the Market Model, is used to calculate the abnormal returns for a sample of 1,026 directors' trades made on the JSE between 2007 and 2012. The results indicate that directors in many of the subsamples tested earn statistically significant abnormal returns in the short term (defined as 20 days post the event date), when purchasing or selling shares in their own companies, although more so on sale trades. There is strong evidence of directors being able to time the market, and that outsiders can mimic directors' trades once these become public knowledge to also earn abnormal profits. These findings are inconsistent with both the strong and semi-strong forms of market efficiency. The study further finds a negative correlation between abnormal returns earned and firm size for both director share purchases and sales. This supports the theory that insiders in smaller companies, which are less exposed to market scrutiny than larger firms, possess greater private information than their counterparts in larger listed businesses. Finally, it is found that the highest insider abnormal returns were earned by director purchases in the Basic Materials and Oil & Gas sector, with the lowest abnormal returns earned in the Consumer Goods and Technology and Telecommunications sectors. The findings of this study have both theoretical implications in terms of the market efficiency of the JSE, as well as practical insights for investors looking for a profitable trading strategy based on director trades.

Contents

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I hereby declare that this is my own work; with any significant contribution and quotation to this dissertation from the work of others correctly cited and referenced.

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Delano Gallagher

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1. Introduction

Numerous studies around the world have provided evidence both for and against abnormal returns being earned by directors trading in their own firms' shares. Researchers who found that abnormal earnings can be earned by insider trades explain this in terms of directors trading on superior information compared to that of the market (Fidrmuc, Goergen, and Rennenboog, 2004). Director purchases in particular are seen as credible sources of information for outside investors, as the directors are investing their own wealth into the future prospects of their firm. Furthermore, as their income and investment gains are drawn from the same source, these directors often have less than optimal diversification to their own portfolios, which enhances the signal their trades send to the market regarding their companies.

Insider trading, as defined, incorporates both legal and illegal conduct (Commission, U.S. Securities Exchange, 2013). Insider actions that constitute illegal conduct is similar in most countries, and the trading of shares in one's own firm while in possession of material non-public information (and in so doing breaching a director's fiduciary duty), is prohibited. In most countries directors are permitted to use information gained from their position to trade in their own firm's shares, provided the information is not price sensitive and the required public disclosure process is followed. In addition, directors are not prohibited from taking a public view on whether the share price is under or overvalued by the market.

Insider trading is regulated in most countries due to its perceived harmfulness to the market and its participants (Etebari, Tourani-Reid, and Gilbert, 2003). This is also the case in South Africa, where the country continues to strive to lessen the divide between the 'haves' and the 'have nots' (Johannesburg Stock Exchange, 2015). The effects of insider trading includes increased bid-ask spreads (Chung and Charoenwong, 1998), reduced investor confidence (Leland, 1992), and reduced market liquidity (Leland, 1992, and Friederich, 2002). Insider trading has therefore become increasingly regulated in many countries, including South Africa.

If director insider trades convey valuable inside information, a question that arises is whether outsiders can earn abnormal returns by simply mimicking the insider trades. This study, using companies listed on the Johannesburg Stock Exchange (JSE) main board as a

sample, therefore investigates, under various stylised facts, whether (i) it is possible for insiders investing in their own companies' share on the JSE to earn abnormal returns, and (ii) whether outsiders can do the same by using these trades as trading signals. The stylised facts include the company's market capitalisation (size) and industry classification (sector), and the impact of these company attributes on the abnormal returns generated by these trades, if any. As far as the author is aware, only a very small number of studies globally[1] have investigated the size and industry relationship to insider returns, and no prior study has addressed this issue in the South African context. This study therefore fills this gap in the literature. From a practical perspective, the results of this study may indicate to outside investors which class(es) of director trades (if any) are potentially most profitable to mimic in order to earn abnormal returns, although admittedly there is a brief lag between the director's trade and the announcement of the trade to the public.

In terms of process, this study will firstly build a base by investigating the abnormal profits that can be earned by outsiders by mimicking directors' trades[2], both for their buy and sell trades, by using data for the period 2007 to 2012. The study will look at the abnormal returns over the period -20 to +20 days relative to the public announcement of the director trade[3], to identify if any abnormal returns earned in following directors are earned immediately post the director's trade, or are possibly sustained over a more medium term.

Thereafter the study will analyse if a firm's size affects the abnormal returns available to investors mimicking director trades. This will be based on the theory that a director's insider advantage is inversely correlated to firm size as (i) information on larger companies is generally more widely available, and therefore the signalling value on these directors' trades may be less if the information they trade on is already public knowledge, (ii) similarly, larger companies enjoy greater attention from analysts and investors than

[1] Ek and Erlinder (2015) investigated how the size and industry of firms on the Swedish stock exchange effect the abnormal returns available to insiders, whilst Hong and Huang (2005) investigated the effect a firm's size has on the abnormal returns available to insiders.

[2] For this study, the terms insider and director will be used interchangeably, and outside investors will refer to all market participants external to the particular firm at hand.

[3] The study will use the date on which the transaction is announced on the Johannesburg Stock Exchange's SENS platform as the event date. Throughout the study the use of the terms event date and SENS announcement date will be used interchangeably.

smaller companies, and the information asymmetry between directors (insiders) and outsiders is thus likely to be less in these cases, and (iii) there is a greater separation between ownership and management in larger firms (Gregory, Matatko, Tonks, & Purkis, 1994). Prior South African studies (see, for example, van der Plas, 2007, and Nair, 2008) specifically excluded small capitalisation (henceforward referred to as small cap) firms due to the liquidity problems associated with the shares of these firms in the South African environment, which would impact the validity of study findings. Small cap firms however, were included in the present study, after making adjustments for liquidity factors in the calculations. As can be seen from Table 1 below, the South African small-cap equity market represents 3% of the total market cap of stocks listed on the JSE as at 31 December 2015. Although this is not a significant percentage, there exists the possibility for directors as well as outsiders mimicking these transactions to earn abnormal returns. It would thus be beneficial to investigate the ability for the directors of these firms to earn abnormal returns, an aspect missing from the current (limited) academic research of insider trades in South Africa.

Table 1 - JSE by Market Capitalisation (at 31 December 2015)

Rm's	Top 40	%	Mid Cap	%	Small Cap	%	Fledgling	%	Total
2007	4 303 130	**85%**	596 589	**12%**	133 277	**3%**	49 556	**1%**	5 082 551
2008	2 533 936	**83%**	421 487	**14%**	87 932	**3%**	25 146	**1%**	3 068 502
2009	3 732 772	**85%**	559 867	**13%**	97 433	**2%**	23 958	**1%**	4 414 031
2010	4 159 567	**83%**	682 293	**14%**	126 144	**3%**	24 649	**0%**	4 992 652
2011	4 568 080	**83%**	773 362	**14%**	132 550	**2%**	29 101	**1%**	5 503 094
2012	6 208 431	**84%**	969 075	**13%**	186 497	**3%**	49 159	**1%**	7 413 162
2013	7 320 739	**84%**	1 117 482	**13%**	233 817	**3%**	55 148	**1%**	8 727 186
2014	8 400 251	**83%**	1 329 683	**13%**	296 812	**3%**	71 597	**1%**	10 098 342
2015	9 278 797	**85%**	1 320 886	**12%**	290 481	**3%**	75 480	**1%**	10 965 644

The results will be used to identify which class of firm by size would provide the greatest abnormal returns to directors trading in their own firms, as well as the best opportunity for abnormal returns for outsiders mimicking director trades.

Thereafter each broad size classification will be analysed independently, and its insider trade abnormal returns calculated in relation to the relevant benchmark for that size company[4] as opposed to the market as a whole (as was the case in the first part of the size analysis).

In addition, the study will review whether a company's sector, as defined by its industry classification according to the JSE, affects the abnormal returns earned from the director dealings and which, if any, of the industries provide the best opportunities for outside investors to mimic directors' trades in order to earn abnormal profits. The JSE's sector classification is based on that of the ICB (the International Classification Benchmark). There are three broad categories: Resources, Financials and Industrials. The second level of this classification, along with the number of firms in each as at 31 August 2016, is listed below:

Table 2 - JSE by Industry Classification as at 31 August 2016

Industry	Number of Firms
Basic Materials and Oil & Gas	23
Consumer Goods	16
Consumer Services	24
Financials	63
Health Care	7
Industrials	24
Technology and Telecommunications	6
Utilities	0

The rest of the introduction will deal with a comparison of insider trading legislation of two of the most established regulation systems (that of the US and the UK), as well as the more recently established South African regulation system, before discussing the hypotheses and definitions that form the basis of this study.

[4] An example to further illustrate the procedure would be as follows: an investor trading in a small cap firm would have the returns earned from that trade compared to the chosen small cap benchmark for the same period to calculate the abnormal return; likewise a trade in a large cap firm would be compared to that of the chosen large cap benchmark. Therefore a like for like comparison will be made to formulate the findings.

1.1. Comparison of Legislation

Most countries have some form of insider regulation in place to protect the market and investors from the harm insider trading can cause. The principal argument for the regulation of insider trading centres around the fairness[5] to market participants and market sustainability if insiders had the unfair advantage of being able to trade on material insider knowledge prior to the information being released to the market (Nair, 2008). Other arguments for the regulation of insider trading include that insider trading incentivises managers to take corporate actions that are not in the best interest of the firm so as to trade on this information for their own personal profit (Leland, 1992), whilst Padilla (2011) states that insider trading should be regulated because investors shun markets where insider trading is prevalent, thus hampering capital market development.

Arguments against insider trading (and hence for the legalisation of insider trading) include the following: (i) it promotes market efficiency (Hammil, Mcinkenny, and Opong, 2002) through the increase flow of information to the market, which in turn helps the market formulate a price for the firm (Manne, 1966), (ii) it allows outsiders access to the previously restricted insider information post the director's trade, which will see market prices moving toward their fundamental share value (Nair, 2008, and Manne, 1966), and (iii) by allowing insider trading, directors are incentivised to seek and produce additional information that will then be passed onto the market once the insider earns an abnormal return (Manne, 1966).

Those arguing against insider regulation believe that the share price information acquired to maintain accurate security prices (economic efficiency factors) outweigh the cost of insider profits (fairness for all shareholders) (Hammil, Mcinkenny, and Opong, 2002). As put forward by the Nobel Prize winner Milton Friedman (2003, cited in Hotson, Kaur, and Singh, 2007) *"You want more insider trading, not less. You want to give the people most*

[5] Fairness, in financial markets, has been described as all parties having equal access to information relevant to asset valuation (Shefrin & Statman, 1993). It can therefore be contended that allowing insider trading would mean that certain market participants, specifically those not privy to insider information, are significantly disadvantaged as they receive the relevant information late or not at all. Should these participants withdraw from the market, the argument goes that the sustainability of the financial markets may ultimately be at risk.

likely to have knowledge about deficiencies of the company an incentive to make the public aware of that".

South Africa adopted insider trading regulation fairly late (Chitimira, 2014) compared to the United States (US), United Kingdom (UK) and European Union (EU). Despite both being leaders in insider trading regulations, the systems of the US and UK/EU differ somewhat, with the US using a "Fiduciary-Duty"[6] based theory and the UK/EU using a "Parity of Information" [7] based theory, as a basis for their insider trade regulation. South Africa, in turn, has largely based its insider trading regulation on the UK system.

1.1.1. US Legislation

Insider trading regulation in the US can be dated as far back as 1909, when the US Supreme Court found that a director who knew his company's share price was to increase was committing fraud by acting on this information. Subsequently, the Securities Exchange Commission (SEC) started regulating insider trading in 1933. The "Parity of Information" theory formed the basis of regulation from 1933 until 1980, when the US Supreme Court altered the basis of the US regulation by ruling that an insider was only in violation of insider trading if they i) acted on material non-public information, and ii) acted contrary to their fiduciary duty. In so doing the SEC did not explicitly prohibit insider trading; rather a director's trade in his or her own company's stock is deemed legal if the director releases the information to the market in accordance with the guidelines imposed by the SEC (Hu and Noe, 1997).

The rules governing the disclosure of the trade depend on whether the director holds stock in the firm already. If they do then they are required to report their change in ownership electronically to the SEC within 2 business days, and if they do not within 10 business days. The director's company is required to post the trade on its own website, if they have one, by the end of the next business day following the filing of the trade with

[6] Fiduciary Duty is a legal obligation of someone entrusted with the care of the business to act in the best interests of another party.

[7] The Parity of Information theory has anyone who obtains, or is aware of, material non-public information in regards to an issuer or security because of their professional activity should either disclose the information (when allowed to) or abstain from trading on the information (Ventoruzzo, 2014).

the SEC (U.S. Securities and Exchange Commission, 2013). The information received by the SEC is then included in the SEC's online EDGAR system.

Under US legislation insiders include both executive and non-executive directors, as well as other key employees, and also shareholders holding 10% or more of any equity class (Lakonishok and Lee, 2001).

The most controversial issue with the US legislation, when compared to other leading insider legislation, is the need to identify what constitutes a fiduciary duty using case law, which complicates matters. The fiduciary duty can be summarised as the relationship of trust and confidence between the director of the company and other parties. More specifically the director is required to refrain from self-dealing in confidential information owned by another party - in this case information created by the company itself (Bainbridge, 2001). Rather the director has a fiduciary duty to protect other shareholders, and therefore trading in a way to benefit him/herself to the detriment of other shareholders by using insider information they may possess, would be in breach of this duty.

1.1.2. UK Legislation

UK insider trading regulation has not been in place as long as its US counterpart, with insider trading only labelled as illegal as late as 1980 with the enactment of sections 69-73 Part V of the Companies Act 1980 (Franklin, 2013). Thereafter the provisions were consolidated into the Companies Securities (Insider Dealing) Act 1985, before being amended by the Financial Services Act 1986, which together with the 1977 Model Code of the LSE (London Stock Exchange), governed insider trading in the UK for some time (Fidrmuc, Goergen, and Renneborg, 2006).

The European Community, EC, which the UK is currently still part of, later agreed to coordinate rules around insider trading which led the UK to enact Part V of the Criminal Justice Act 1993. This however did not lead to many prosecutions against individuals for insider trading due to the high standards required to find the defendant guilty of a criminal offence. In response to this issue the Financial Services and Markets Act 2000 was introduced which allowed an additional civil charge to be levied against an individual for

'market abuse'. The civil charge requiring less onerous evidence than the criminal charge and thus increasing the likelihood of prosecution.

Insider information is defined as *"information that is not generally available and that a reasonable investor would use to help them make investment decisions. It is also information that, if generally available, would be likely to significantly affect the price of an investment"* (Financial Services Authority, 2008).

The UK regulations are more restrictive than their US counterpart, with the main restrictions for directors trading in their own companies' stocks including: (i) prohibited dealing within 60 days preceding the preliminary announcements of the final and interim results and 30 days preceding quarterly earnings announcements results, ii) a prohibition on trading when in possession of price-sensitive unpublished information, iii) a requirement to obtain clearance from the company chairman before trading (subject to the restriction mentioned in i) above, and iv) a requirement for the disclosure of any insider dealings to the UK Financial Services Authority (FSA) within four business days of the trade.

Mandatory reporting in the UK is limited to executive board members and non-executive directors, excluding other key employees and large shareholders, which is slightly less onerous than the US where all directors, other key employees and shareholders holding more than 10% of any equity class are required to disclose their trades (Fidrmuc et al., 2006).

In summary, one of the key differences between the US and UK systems stem from the US attempting to mitigate insider advantages by frequent disclosure; whereas the UK system places bans on trades during price-sensitive periods (Fidrmuc et al., 2006). This could be interpreted that the US is more liberal regarding insider trading as it is allowed at any time; however it must always be reported to allow the market to act on the information.

1.1.3. SA Legislation

The need for insider trading regulation may be seen as even more necessary in SA due to the ongoing struggle to attract and retain investment flows. To encourage flows market

participants need to be comfortable in viewing the market itself as being efficient, fair and reputable, which in turn requires a transparent system that either prevents insider trading (similar to UK regulation) and/or requires constant disclosure of the trades (similar to US regulation).

Until 1999 insider trading was dealt with by the Companies Act of 1973, which in cases of insider trading required guilt to be proven beyond reasonable doubt for criminal sanction to be meted out. This made a successful prosecution highly unlikely, resulting in no cases being taken to court prior to 1998 (Nair, 2008). The Insider Trading Act (1998) (Johannesburg Stock Exchange, 2015) introduced the possibility of civil action in addition to the existing criminal action as a course of action in the context of suspected insider trading. Civil action requires a balance of probabilities to be used for a decision to be made on any offences, making it more likely than before that insiders would be prosecuted for trading on non-public material information. 2013 saw the introduction of the Financial Markets Act (2012) which dealt with market abuses of insider trading, amongst other issues. (Johannesburg Stock Exchange, 2015)

The definition of insiders is broad and includes directors, employees and advisors, as well as other individuals who may have received the information inadvertently or in an unguarded social setting; similar to the US and UK systems. This definition of an insider was used in the analysis to follow (Johannesburg Stock Exchange, 2015).

The Johannesburg Stock Exchange (JSE)'s reasoning for requiring the disclosure of insider trades is to ensure a greater degree of public access to insider views so that no individual has an excessive undue informational advantage when trading. The JSE does not recognise information, deemed as material to investors, as being public until it is disseminated through its JSE Stock Exchange News Service (SENS), and a company is in fact required to wait until SENS have disclosed the information before placing any price sensitive information on their own website (Johannesburg Stock Exchange, 2015).

The JSE has introduced additional listing requirements for director dealings, many of which are based on the rules in place in the UK. These include: i) a director is prohibited from trading in securities of their firm without the prior permission of their companies' chairperson, ii) a director may not be given permission to trade during a prohibited

period[8], iii) a director is required to disclose any trades to their company within 24 hours, iv) and the company is required to disclose the trade publically (to the SENS) within 24 hours of receipt of the information (Johannesburg Stock Exchange, 2015).

It is clear that SA has adopted a system much the same as the UK, using a balance of probabilities theory,[9] along with a greater emphasis on banning insider trades during certain periods.

1.2. Relevant Theories and Hypotheses

The next section will cover certain key financial theories important in the topic of insider trading.

1.2.1. The Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH) implies that in an efficient market all available information must be reflected in the share market price (Fama, 1965). Share prices would thus adjust immediately as the market changes its perception regarding a share.

Malkiel and Fama (1970), in a later paper, introduced three forms of market efficiency, respectively defined as follows:

i) **Weak form:** Current stock prices reflect all past information.

ii) **Semi-strong form:** Current stock prices reflect past information as well as currently available public information.

iii) **Strong form:** Current stock prices reflect all public and non-public information. In other words, it includes both past and current publically available information, as well as non-public information (Malkiel and Fama, 1970).

The strong form of the EMH implies that directors that have access to insider information should not be able to earn abnormal returns. If directors of South African companies were

[8] A prohibited period is defined as either, a) the date from the financial year end up to the publication of the earliest report, b) mid-year and quarter-year ends and the publishing of those results, and c) any period during which the company is under a cautionary announcement.

[9] The balance of probabilities theory means that a court will deem an event as occurring if the court, based on the evidence presented, considers the event's occurrence more likely than not (RE H and Others (Minors), 1995). Expressed in percentage terms, the judge only needs to conclude that there is more than 50% likelihood that the claimant's case is right, then the claimant will win and the defendant will lose. In respect to insider trading, the insider is the defendant.

able to time the market in terms of buying their company's shares before a share price increase, and likewise sell before a share price decrease, then it would indicate that the South African market is not strong-form efficient. Directors have insider information pertaining to their company resulting from their position within the company; however what is of interest is whether they trade on this information before it becomes public. If it is found that directors do earn abnormal profits then it can be argued that this is the result of their access to insider information, which would infer that the South African market is strong-form inefficient (Neill, Sadeghi, and Watts, 2008).

Similarly, if outside investors are able to earn abnormal returns by mimicking insider trades, then a market is not semi-strong form efficient. The insider's trade, which is deemed to carry information about the company, becomes public data once it is disseminated *via* public communication platforms such as SENS in South Africa. If outside investors are able to earn abnormal returns by trading these shares based on publically announced directors' trades, then the market cannot be semi-strong form efficient, as the market's share price then does not include all current and past information.

1.2.2. The Signalling Hypothesis

Signalling Theory has been part of academic discourse since Spence (1973) published a seminal paper in which he introduced his job-market signalling model. Signalling is based on the idea of asymmetric information, where one party has better access to information, and is defined as one party, through an action, indirectly conveying that better information to another party.

Many papers on insider trading (only a small sample of which are discussed here) conclude that outsiders can earn abnormal profits by mimicking insider trades (generally before transaction costs are accounted for), as insiders are seen as holding superior information related to their company. In terms of Signalling Theory discussed above, insiders have asymmetric information that, by trading in their company's shares, they convey to outside investors. For example, Bettis, Vickrey and Vickrey (1997) found in their study, where they analysed the US market between 1985 and 1990, that outsiders could earn significant abnormal returns by mimicking insider trades. The insiders are deemed to have access to better information, which outsiders are able to interpret through the director's' trades

and trade for their own account accordingly. Similarly, a study performed by Zingg, Lang and Wyttenbach (2007) on 2,302 insider transactions in 2005 and 2006 on the Swiss stock market found that abnormal returns could be earned by outsiders mimicking insider trades, likely due to the assymetric information held by these insiders. This study, however, found that the outsiders' abnormal profits are insignificant once transaction costs are accounted for. Stotz (2006), based on a sample of 976 insider trades on the German stock exchange between July 2002 and July 2003, also found that abnormal returns are possible for outsiders mimicking insider trades. Outsiders were able to earn 2.81% on mimicked purchases and 2.20% on mimicked sales, both before transaction costs. Where Stotz's (2006) findings differed from those of Zingg, Lang and Wyttenbach (2007), was the ability for an outsider to continue to earn significant abnormal returns post transaction costs.

1.2.3. Formulation of Hypotheses

The objectives of this study are to investigate whether directors trading in the shares of their companies on the JSE are able to earn abnormal returns (including when considering purchases and sales separately), and more specifically whether mimicking such trades form a basis for a profitable trading strategy for outside investors. The second objective of this study is to test whether firm size and firm industry is related to any abnormal returns that may be present.

The hypotheses to be tested are therefore as follows:

$H1_0$: Abnormal returns cannot be earned on the JSE by mimicking directors' *insider share trades*

$H1_a$: Abnormal returns can be earned on the JSE by mimicking directors' *insider share trades*

$H2_0$: Abnormal returns cannot be earned on the JSE by mimicking directors' *insider share purchases*

$H2_a$: Abnormal returns can be earned on the JSE by mimicking directors' *insider share purchases*

$H3_0$: Abnormal returns cannot be earned on the JSE by mimicking directors' *insider share sales*

$H3_a$: Abnormal returns can be earned on the JSE by mimicking directors' *insider share sales*

If the empirical evidence on the JSE supports any of the above alternative hypotheses, the applicable following hypotheses will be investigated:

$H4_0$: Abnormal returns earned by investors mimicking directors' inside trades on the JSE is independent of the *size of the companies* involved

$H4_a$: Abnormal returns earned by investors mimicking directors' inside trades on the JSE is dependent on the *size of the companies* involved

$H5_0$: Abnormal returns earned by investors mimicking directors' inside trades on the JSE is independent of the *industry* involved

$H5_a$: Abnormal returns earned by investors mimicking directors' inside trades on the JSE is dependent on the *industry* involved

In addition to the testing of the above hypotheses, the study will indirectly also test if directors are able to earn abnormal returns through their insider trades on the JSE. The testing of both directors' trades and the ability for outside investors to mimic these insider trades to earn abnormal returns is possible because of the close proximity of the director's trade and the SENS announcement date (the first opportunity for the outside investor to mimic the directors' insider trade). This is the result of a SENS listing requirement that a director's trade must be disclosed within 48 hours of the trade itself.

The remainder of this dissertation is structured as follows: Chapter 2 will look at the international and local literature regarding director dealings. Chapter 3 will introduce the sample and data to be used in this study, while the research methodology will be discussed in Chapter 4. The results will be presented, analysed and discussed in Chapter 5, which will be followed by a conclusion in Chapter 6.

2. Literature Review

The literature review will firstly discuss international literature on insider trading before moving onto the South African literature. The international literature has a long history and a large number of papers have focussed on the topic of insider trading and issues related to it, and therefore the discussion below is grouped by topic. The South African literature on insider trading is quite sparse by comparison, and will be fully analysed in the second part of this chapter.

2.1. Existing international studies

Insider trading has been extensively researched by international academics. In this regard, the ability of insiders to earn abnormal returns has been investigated in the US as far back as the 1970s (Jaffe, 1974), with recent research on the topic particularly prevalent in the UK, Australia and the US.

2.1.1. Timing the market

Directors are in the unique position that they receive information before outside market participants do, despite regulations in place to negate this advantage.

Past studies found that directors act as contrarian investors; buying stocks after the price has fallen and selling when the price has risen (Uylangco, Easton, and Faff, 2010), using their first mover advantage to earn abnormal profits. Looking at the buy transaction in isolation, the director will attempt to time the buy of the share right after it has experienced a decline, purchasing it before the market has had time to change its view from a sell to a buy. The contrary is true for the selling perspective of a director's trade; holding the share while its price appreciates and selling it before the price begins to depreciate (Stotz, 2006). In so doing directors use their inside knowledge to time the market, generally earning higher profits than outside investors, as they get the first mover advantage.

Directors buy shares presumably when they see value as stated in the prior paragraph; while outsiders in terms of Signalling Theory assume that directors have superior knowledge (Lakonishok and Lee, 2001), and can thus potentially mimic directors' trades in an attempt to earn abnormal profits. One issue that complicates the reasoning for

abnormal profits is that director trades themselves may generate a portion, if not all of the abnormal returns, simply because outside investors may be mimicking the trade solely because it is made by a director. The outside investors accept that insiders may have superior information, even if they in fact do not, and in so doing through momentum trading cause a greater share price change, therefore creating a larger abnormal return for the insider (Givoly and Palmon, 1985). This increased profit effect would generally only result in shorter term profits, as it is unrelated to any fundamental information, and outsiders will soon realise that there is no informational value to the director's trade.

The existence of abnormal returns can be construed as the market reacting to information received in advance of a public announcement through legitimate channels. Studies are wide ranging but point to the same conclusion - price sensitive information is acted upon by directors pre-announcement, and outsiders can mimic these trades to earn their portion of abnormal returns. Some studies have found similar results for other corporate announcements (Hotson et al., 2007). Examples include studies by Keown and Pinkerton (1981), who looked at the daily stock price movements between 1975 and 1978 for 194 successfully acquired firms and concluded that trading occurs on nonpublic information prior to the merger announcement, by Ke, Huddart, and Petroni (2003) who studied 309 190 trades between 1989 to 1997 and found evidence of US insiders selling shares prior to an unfavourable earnings announcement, and by John and Lang (1991), who found that the share price effect of a dividend announcement is influenced by the extent and direction of the insider trade prior to the dividend announcement[10].

The ability for outsiders to mimic insider trades and still earn profits while all (relevant) information is made public implies that markets are not semi-strong form efficient[11]. In the US, which has the most extensive director dealings study database, studies by Seyhun (1986) and by Rozeff and Zaman (1988), found that outsiders are unable to earn excess returns, net of transaction costs. This indicates that the US market exhibits the semi-strong form of market efficiency. Other US studies by Bettis et al. (1997) and King, Roell,

[10] John and Lang (1991) found that an increase in dividends and insider holdings (prior to the dividend announcement) more than was expected by the market lead to a greater positive share price effect. Likewise if there are an increase in dividends but a decrease in insider holdings (prior to the dividend announcement) then a negative share price effect was observed.

[11] Defined as discussed in the introduction under EMH.

Kay, and Wyplosz (1988), however, find that the converse is true, and that both insiders and outsiders can earn abnormal returns, net of transactions costs. This, in turn, points to the US market not being semi-strong form efficient.

Givoly and Palmon (1985) found that companies traded by insiders do not show particularly positive/negative information signals, including earnings and dividend announcements, post the director's trade.

A more recent study conducted in the UK (Fidrmuc et al., 2006) found that market participants could still made gains mimicking director dealings, despite earlier information being announced about the prospects of the companies these directors were trading in. This could imply that insiders believe directors may know even more than what is released to the public *via* normal announcements.

2.1.2. Contrarian Investing

As mentioned in the previous section, in the process of timing the market insiders trade as contrarian investors. Contrarian trades can be defined as those where the investor buys a share with a high book to market value (Rozeff and Zaman, 1998). A high book to market value means the accounting value (assets less liabilities as per the financial statements) is greater than the value of the share as priced by the market. This could mean the share is undervalued by the market and opens up an opportunity for investors to unlock value that is not already priced into the share value. Investors in these shares assume that the share price will increase to its fundamental value in the future (Mokale, 2010). A share which performed poorly in the recent past will in most cases have a high book to market value. Another ratio used to identify contrarian investments is a high cash flow to price ratio, which indicates a large amount of cash for future investment without increasing debt (Rozeff and Zaman, 1998).

It is, however, not only insiders that trade in a contrarian manner. Outsides do as well, and this is an investment philosophy followed by many large asset managers. It can therefore be assumed that outsiders would earn the same abnormal profits as insiders did, if it was merely due to the contrarian nature of the insiders' trades. However, a study done by Gangopadhyay, Ken and Sarwar (2009) in the US on director trades between 1999 and 2002, found the excess returns earned by directors to be made up of two

components, namely (i) the return due to the contrarian nature of the investment and, (ii) the return due to trading on insider information. Shares purchased by directors were shown to earn a total return of 22.5% per annum more than shares sold by directors, with the difference still being 13.9% when the contrarian nature of the trade is excluded[12]. Therefore, the conclusion was that insiders do in fact earn a large percentage of their abnormal profits not only from trading in a contrarian manner, but also due to holding superior (inside) information.

2.1.3. Director sales vs. director purchases

A key question is whether directors' sales provide as much information to the market as directors' purchases do. Although directors may sell shares when they have information that could cause the share price to fall in the future, other reasons for selling, which do not provide additional information about the share or the underlying company to the market, include the exercise of options, personal liquidity needs, and tax timing issues. Many international studies therefore address this issue.

In most cases it was found that director purchases led to higher abnormal returns than director sales, seemingly therefore being more reliable in providing insider information to the market. Relevant studies in the US supporting this view include those by King, et al. (1988) and Lakonishok and Lee (2001), and in the UK those by Gregory et al., (1997), Hillier and Marshall (2002) and Fidrmuc, et al. (2006).

However, a few studies, such as those by Pope, Morris and Peel (1990) in the UK and Neill et al. (2008) in Australia found the opposite result, namely that director sales led to higher abnormal returns than director purchases. Mordant and Muller (2003) in South Africa found that whilst director sales earned abnormal returns, director purchases did not.

[12] The study by Gangopadhyay et al. (2009) found insiders selling, more than buying, when their company had a high price-to-earnings multiple (P/E) and a low book-to-market (B/M) ratio. These criteria where used to find that the insiders were contrarian. However, if the insider trades on insider information they may or may not be contrarian. Piotroski and Roulstone (2005), basing their study on US market data between 1992 and 1999, similarly found that insider purchases were positively related to B/M (an indication of a contrarian approach), and future earnings performance (an indication of insider trading).

There are therefore opposing thoughts as to whether (i) director sales or purchases in their own company's shares earns a higher abnormal profit, and (ii) whether outsiders should mimic merely the insider sales or purchases, or both, or neither.

2.1.4. Period over which abnormal returns are earned

Studies have used various event window periods[13] when investigating the ability for insiders, and outsiders, to earn abnormal returns from director trades. Some prior studies suggest the event window should be no longer than 10 days, or the model itself will lose its power (Kothari and Warner, 2004), whilst other studies are of a short term nature as they found that outsiders' ability to earn abnormal returns dimish significantly once insiders transactions are made public (Dickgiesser and Kaserer, 2009).

Some studies consider both the short and long term abnormal returns earned by insider trades. Neill et al., (2008) investigated cumulative abnormal returns (CARs) earned on the Australian stock exchange at predefined intervals between the transaction date and 120 days thereafter. CARs where earned for both inside purchases and sales from the transaction date (T) through to T+1, T+5, T+30, T+60, T+90, T+ 120 days thereafter, except for T+1 for insider sales. CARs rose to 3.98% and 9.39% for the period T+120 days. A study performed by Biesta, Doeswijk and Donker (2003) on the Dutch stock exchange found abnormal returns earned both in the short term and long term. CARs earned at T+21 were 2.23% for purchases and 1.91% for sales, whilst CARs earned T+120 were 11.3% for purchases and 2.4% for sales.

Other studies have focussed more on the long term abnormal profits earned from insider trades, including the studies done by Gregory, Matatko, Tonks and Purkis in 1994 on the UK market between 1984 and 1986, as well as the subsequent study done byGregory, Matatko, Tonks and Purkis in 1996 on the UK market between 1986 and 1990. These studies found that significant monthly abnormal returns were earned for up to 24 months post an insider buy trade, whilst abnormal returns earned from a sell were only significant in the initial period.

[13] The event window, as discussed later under the methodology section, refers to the period of days prior (20 days) and post (20 days) the event day over which the analysis is performed.

One of the issues with using a longer period is the possibility of the findings being affected by other outside factors (noise) which could result in the incorrect conclusions being made (McWilliams and Siegel, 1997). Other studies therefore focus only on the shorter term analysis of the CARs. Two often cited UK studies analysed firms on the London Stock Exchange. Hammil, Mcinkenny and Opong (2002) considered only the period ten days post the share dealing date, and found signficant CARs for purchases (reaching 1.06% at 10 days post trade) but not for sales, whilst Friederich et al. (2002) used a twenty day period post the share dealing date and found significant CARs for purchases (up to 1.46% and 1.96% at 10 and 20 days respectively) and sales (up to 1.07% and 1.46% at 10 and 20 days respectively).

However, there is still significance to the results that are determined when looking at the longer, and shorter, period for abnormal returns.

2.1.5. Large vs. small cap firm insider abnormal returns

The majority of international studies undertaken found that insiders do earn abnormal profits, as mentioned above, with a number finding that directors dealing in small cap firms earned larger abnormal returns than those of larger firms[14]. The possible reasons advanced for the above finding can be summarised as: (i) larger companies are subject to more public scrutiny by analysts and other market participants, which results in the directors having much less valuable inside information relative to the market when compared to directors of small companies, (ii) smaller firm directors are generally more familiar with the operations and future prospects of the company (one such reason includes directors of smaller companies being more involved in the day to day running of their companies), (iii) larger firms have more non-executive directors who are less intimate with the firm's operations and, (iv) larger firm directors face greater scrutiny in terms of their transactions by the public and regulators, and thus they generally trade less/smaller amounts in their own firm. In addition the share price of larger firms will react

[14] For examples of director dealings in small cap firms earning larger abnormal returns than those in large cap firms in various international markets see the following studies: Seyhun (1986), which looks at approximately 60,000 insider trades between 1975 and 1981 in the US, Hillier and Marshall (2002),which looks at 7,392 insider trades between 1992 and 1996 and Gregory et al. (1994) which looks at 1,653 non option related insider trades between 1984 and 1986 (both UK), Etebari et al. (2003) which looks at 2,453 insider trades between 1995 and 2001 in New Zealand, and Neill et al. (2008) which looks at 8,053 insider trades between 2002 and 2006 in Australia.

quicker due to their listed nature, thus reducing any abnormal gains available to directors (Gregory et al., 1994).

The higher returns earned by directors invested in smaller firms may, however, be due to the small firm effect (Fama and French, 1992). Gregory et al. (1994) incorporated thin trading into their methodology and found that much of the abnormal returns associated with small cap companies disappear once liquidity effects are accounted for. The study found that abnormal returns are higher for smaller firms, but when the correct benchmark is utilised, the abnormal returns earned by directors all but disappear. In a more recent study Ek and Erlinder (2015) found abnormal returns were still available for insiders trading in small cap firms, even after making adjustments for thin trading, or comparing the results to a small cap specific index.

There are a number of issues with small cap firms that impact the findings and would otherwise incorrectly show differences in the abnormal returns earned between small and large cap firms. These issues include: (i) small cap share trades may be infrequent resulting in monthly returns being calculated off incorrect prices (*i.e.* the issue of low share liquidity), (ii) small cap firms generally outperform large cap firms and thus the 'abnormal return' may be due to the small firm effect (Fama and French, 1992), and (iii) liquidity issues may result in larger transaction costs, created by wider bid-ask spreads (Glosten and Milgrom, 1985; and Gregory et al., 1994). Another theory put forth by Banz (1981), which he acknowledged as conjecture despite being consistent with the empirical results of his study, is that investors, if faced with differing levels of information in firms, would limit their exposure to smaller cap firms, as there is generally less information available in the public space regarding these smaller cap firms. In another of Banz's studies (Banz, 1980), it was shown that if only a subset of investors were interested in a share, then on average it would provide higher risk adjusted returns than shares that attracted the entire market. Therefore, as there is less information regarding smaller cap firms available in the public space, this will result in increased risk adjusted returns, similar to the conclusion drawn by Gregory et al. (1994).

Differing results have been found in other studies, however. For example, interviews conducted with key players of the Australian finance industry found that insider trading

was focussed on smaller speculative stocks, mostly by directors (Tomasic and Pentony, 1991).

Lakonishok and Lee (2001), while examining insider trading in all companies traded on the NYSE (New York Stock Exchange), AMEX and Nasdaq between 1975 and 1995, did not find major market movements around the trades, meaning outside investors initially dismissed the information provided by the director trade. However, where abnormal returns were earned it was invariably higher for smaller firms. At least 55% of the sample firms experienced insider trading (buying or selling). However, insiders of larger firms were more active, with at least 72% of these firms experiencing some form of insider trading.

Perhaps one of the more conclusive studies conducted on the effect of firm size on abnormal returns was that of Ek and Erlinder (2015) , who conducted their analysis on Sweden's OMX NASDAQ Stockholm. These authors formed clusters based on firm size (large, medium and small), and found that Cumulative Average Abnormal Returns (CAARs) were earned in varying degrees based on firm size. It was found that hypothetical outsiders basing their trades on insider transactions were not able to earn abnormal returns for sales or purchases of large cap companies, but were able to earn abnormal returns of up to 2.89% for sales in mid cap and 1.66% for small cap companies, and up to 0.37% for purchases in medium cap, and 1.75% in small cap companies. The study focussed on the short term, with the window stretching to a maximum of 10 days post the trade.

2.1.6. The link between industry category and insider trade profitability

Two papers have reported findings on the link between abnormal returns and industry classification. The first of these was an investigation into insider activity on the Hong Kong Stock Exchange (Cheuk, Fan, and So, 2006), and the second a recent study by Ek and Erlinder (2015) conducted on the Stockholm Stock Exchange's NASDAQ OMX.

In their study Cheuk et al. (2006) conclude that, regardless of industry, insiders were able to earn some form of abnormal returns. However, the magnitude of these returns were substantially different depending on the company's industry classification. Insiders dealing in financial companies earned the highest abnormal returns (2.8% in the 20 days

following an insider trade), whilst at the other end of the scale insiders dealing in hotels earned a largely insignificant abnormal return.

Ek and Erlinder (2015) divided their firm sample according to the Industry Classification Benchmark (ICB), which is a global classification standard classifying firms into 10 industry groups. The NASDAQ OMX Stockholm is dominated by industrials (a fourth of all companies), financials and technology firms. The study found that the abnormal returns earned in Oil & Gas companies varied between 2.73% and 7.9% in the 10 day event window following the announcement of an insider purchase, whilst Health-Care was the only other industry classification for which statistically significant abnormal returns can be earned by outsider purchases. In terms of insider sales announcements, only Basic Materials (3.46%), Technology (1.82%), and Consumer Goods (2.96%), allowed for statistically significant abnormal returns to be earned.

2.2. South African insider trading studies

The first significant study into insider trading in South Africa (Mordant and Muller, 2003), investigated, firstly, whether directors earned abnormal returns on their insider trades and, secondly, whether outside investors could mimic insider trades to build a profitable trading strategy.

The first half of the study concluded that abnormal returns are available to directors (trading in their company) by timing the market; however the majority of the cumulative annual returns (CARs) were due to the size, value and the resource nature of the shares.

The conclusion to the second half of Mordant and Muller's (2003) study was that outsider investors were unable to earn a profit by mimicking the insider trades. The ability for outsiders to mimic insider trades to earn abnormal profits was investigated in more depth in the unpublished studies of Nair (2008), Mokale (2010), and Moodley, Muller and Ward (2014). The study by Moodley, Muller and Ward (2014) concluded, contrary to Mordant and Muller's study's (2003) findings, that outside investors can earn abnormal profits by mimicking director dealings; going further by identifying the optimal director dealing investing strategy on behalf of the outsider. The final results of Moodley, Muller and Ward's 2014 study gave an optimal lead up time (period to observe director dealings and

base investment decision on), hold period (time to hold the director dealing based portfolio), and market cap of the portfolio for both a buy and sell portfolio.

In addition, the study by Mordant and Muller (2003) found that, contrary to the majority of the international studies on director dealings and their effect on share price, that director sales earned higher CARs than director purchases, with Ismail's 2016 unpublished study drawing the same conclusion. However, another South African unpublished study by Mokale (2010) found the contrary true, with CAARs being 0.72% and 0.44% for purchases and sales transactions respectively.

Previous South African studies focussing on director dealings neglected to discuss the impact of the size of the firm on the ability for directors to earn abnormal earnings, due to the liquidity issues associated with smaller firms. Mokale (2010) focussed only on the top 40 JSE-listed companies, Ismail (2016) and Nair (2008) the top 100, and Mordant, Muller and Ward (2014) the top 160 JSE listed companies by market cap, whereas this study will look at all the JSE listed firms irrespective of size.

A further unpublished South African study, (van der Plas, 2007), focussed on other insider trading issues which, although not the topic of this paper, provide interesting additions to the JSE insider trading issue. One area of investigation was the occurrence of insider trading in the period preceding the announcement of a corporate action, including takeover, delisting and share buy-back transactions of 30 companies listed on the JSE. The study found significant share price run-ups in the acquired company in the event window period prior to public announcement; with 8% of the eventual offer premium anticipated to be due to the pre-bid run-up - a clear indication of possible insider trading.

2.3. Literature summary

The ability of directors to earn abnormal returns, and the ability of outsiders to mimic director's trades to earn abnormal returns, has internationally been studied from a number of different angles, resulting in very different conclusions at times. Of all these studies, only a handful have considered the relationship between company size or industry classification and abnormal returns related to director dealings. Furthermore, in South Africa very little research has been done on directors' dealings in general, and none

on the abovementioned relationships. It is this gap in the literature that this study seeks to fill.

Chapter 3 will introduce the sample and data to be used in this study

3. Data

3.1. The following data was collected for this study:

i) **Population:** Although directors' dealing are reported through the JSE's SENS platform, there is no standardised format for these text-based announcements, and they are therefore only available as text files. Furthermore, they are typically searchable by company within the standard market databases. In order to deal with this severe data limitation, several large text files containing all directors' dealings SENS announcements for the period 01 January 2007 to 31 December 2012 had previously been obtained from Sharenet. These text files were then converted to a usable Excel format *via* an extensive data cleaning process, involving both programing[15] and manual steps.

As far as possible all the director trades of all the companies listed on the JSE were included in the sample, thereby making use of the census method, which negated bias caused by picking out random samples. The data included the company name, value of the director's trade, the nature of the trade (whether the transaction was a purchase or sale), as well as the date the transaction took place (the "transaction date") and the date the transaction was announced on the JSE's SENS platform (the "announcement date"). Because of the JSE's insider trading regulations (see Section 1.1.3), in the vast majority of cases the above two dates were no more than two days apart. The raw sample, before the data cleaning process described below[16], consisted of 10,094 director trades made between 1 January 2007 and 31 December 2012.

ii) **JSE Constituents:** The names of all companies listed on the JSE Main Board at the end of each quarter over the period 01 January 2007 and 31 December 2012 was sourced from Thomson Reuters Datastream. Data collection on a quarterly basis

[15] My thanks goes to A/Prof Ryan Kruger, who did most of the Excel programming work for the conversion.
[16] The raw data had previously been cleaned to remove any options.

was done, so as to remove any survivorship bias that may exist due to companies entering and exiting during the period of investigation.

iii) **Unit of Analysis:** For the shares of the 314 companies which had director trades over the period of investigation, the daily total return index values (used to calculate the daily total returns) for the period 1 January 2004 to 31 December 2013 was obtained from Thomson Reuters Datastream.

iv) **Benchmark data:** The daily total return index values for the All Share Index (J203) was obtained from Thomson Reuters Datastream for the period 1 January 2004 to 31 December 2013. The daily total return values for the FTSE/JSE Top 40 Index (J200), FTSE/JSE Mid Cap Index (J201), FTSE/JSE Small Cap Index (J202) and FTSE/JSE Fledgling Index (J204)[17] was obtained from Bloomberg (Electronic Database) for the period 1 January 2004 to 31 December 2013.

v) **JSE Size Classification and Market Capitalisation:** In order to categorise each company as a fledgling, small, medium or large cap firm[18] so as to match it to its appropriate benchmark, the JSE Quarterly Review, which discloses the current index and market capitalisation for all companies listed on the JSE main board for each quarter end, was consulted.

According to the JSE system the 40 largest companies by market cap are listed as large cap, the next 60 largest firms by market cap as medium cap, the following 60 as small cap, and the remainder classified as fledgling (Johannesburg Stock Exchange, 2012).

[17] Closing share prices Index values were used instead of total daily return index values for the J200, J201, J202 and J204 due to access issues around these benchmarks' total returns.

[18] The categorisation of companies was done on a quarterly basis with the quarter ends set at 31 March, 30 June, 30 September, and 31 December.

Table 3 - JSE Indices: Source JSE (2016)

JSE Index	Index Code	Universe	No. of Firms	Index Review
All Share (ALSI)	J203	JSE Main Board	160*	Quarterly**
Top 40	J200	J203	40	Quarterly**
Mid Cap	J201	J203	60	Quarterly**
Small Cap	J202	J203	60*	Quarterly**
Fledgling	J204	JSE Main board	Not fixed	Annual***

* These numbers vary over time, whereas the number of companies in the TOP 40 and Mid Cap indices are fixed.

** Quarterly – March, June September and December

*** Annual –December

vi) **Firm Classification:** The complete list of JSE listed companies and their industry classification in line with the Industry Classification Benchmark (ICB), was obtained from Thomson Reuters Datastream. The nine classifications were basic materials, consumer goods, consumer services, financials, industrials, health care, technology, telecommunications, and oil and gas.

3.2. Data cleaning and preparation:

As mentioned above, the raw data consisted of 10,094[19] director transactions on the JSE between the 1 January 2007 and 31 December 2012. However, certain adjustment and exclusions were necessary in order to render the data suitable for analysis. The following was process was therefore followed:

- If a firm had more than one transaction on a day, only the largest transaction by value for a specific company on a specific day was used in the analysis, and all the other transactions were removed from the sample. This resulted in 5,569 transactions remaining in the sample.

[19] In line with past international (Gregory et al., 1994, and Neill et al., 2008) and South African (Nair, 2008 and Mokale, 2010) studies, the exercise of options were removed from the data set before the 10,094 figure was obtained. This was done as the exercise of options generally do not convey to outsiders the director's thoughts on the prospects of the company, but is rather directors exercising their options due to stipulated contractual conditions or liquidity. This resulted in only ordinary shares being used in the analysis.

- Thereafter, in line with previous studies (*e.g.* Klinge, Seifert and Stehle, 2005) any overlapping transactions were removed from the sample. An overlapping transaction was classified as one where there was an insider transaction made in the same firm within 20 days on either side of the announcement date. This was done to remove any incorrect correlation between transactions relating to the same company, which in turn will result in incorrect variances in the CAAR being calculated in the event studies to follow.

- Any director's trade where the company's complete daily total returns were not available for the entire period between 20 days before and 20 days after the event date were next removed[20], as these returns were required to calculate expected returns. This resulted in 906 transactions being removed from the sample.

- Any director's trade where the company's complete daily total returns were not available for the period 21 to 230 days before the event date were removed. Where the share was not traded on a day the return was denoted as a 0% total return value in the data. However, where shares were not listed at all for a part of the above period before a director's trade, the trade was removed from the data set. This is because the beta calculation which forms part of the methodology requires the entire period of daily total returns for the 21 to 230 day period before the event date. This resulted in 252 transactions being removed from the sample.

- Once the above removals had been made, the remaining transactions were tested to identify which shares were too illiquid for the purposes of the analysis. Thus, on the assumption that a zero daily return usually indicates no trades on a particular day, shares with more than 20% of their daily returns being zero over the period 21 to 230 days before the event date, were excluded from the sample. This removed 2,493 additional transactions from the sample, thus reducing the sample to 1,026 transactions. The majority of the transactions removed for liquidity issues related to

[20] Certain daily returns were not available simply because some shares do not trade every day, yet these shares were not excluded. Only shares were all the daily returns were missing during the 20 days before and 20 days after the event date were removed.

small cap (689), and fledgling firms (890)[21]. Only four transactions relating to Top 40 firms were removed, which is expected as they are the largest and generally most frequently traded firms on the JSE. A further 193 transactions relating to mid-cap firms were removed with the other transactions linked to firms without a size classification.

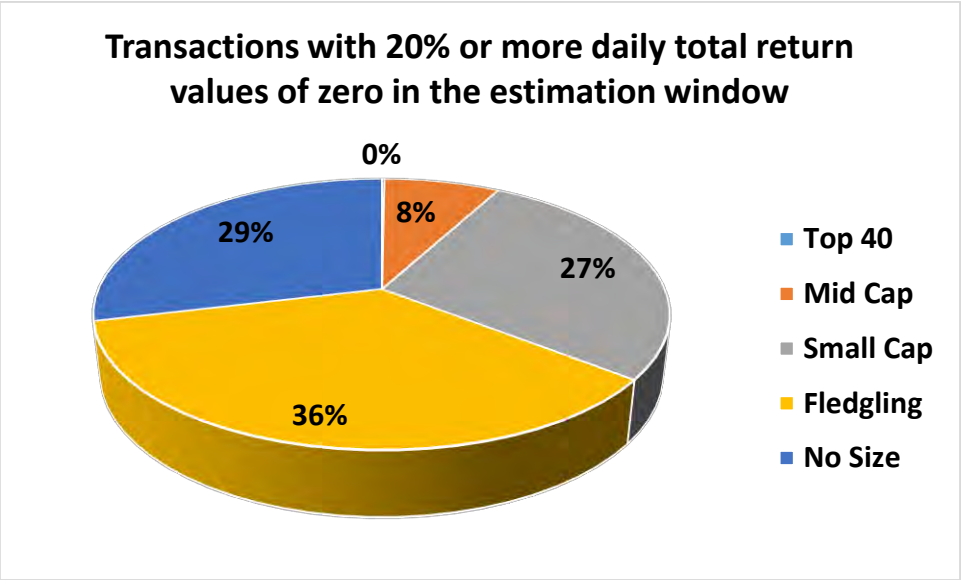


Figure 1: Transactions with 20% or more daily total return value of zero in the estimation window

As shown in Table 4 below, the final data set consisted of 1,026 director transactions across 136 companies, of which of 463 were purchases and 563 sales.

Table 4 - Summary of Director Dealings Data Set used

	Purchases	Sales
2007	78	96
2008	87	37
2009	74	89
2010	88	89
2011	82	141
2012	54	111
	463	**563**

[21] The firms falling into the Fledgling Index are by nature the smallest and the least liquid. The firms are not tested for liquidity by the JSE, as firms in the other 3 Indices are.

4. Research Methodology

The next section will cover the methodology used in the study.

4.1 Event Study Methodology

This study made use of the event study methodology in line with the majority of the international studies covering insider trading. Event study methodology has been in existence since the 1930s, and was brought into the finance realm by Fama, Fisher, Jensen and French (1969). It has subsequently been widely used when identifying share price movements caused by a particular event (Binder, 1998). Event study methodology has therefore become the standard for this type of analysis.

Event studies' central theme is the calculation of the abnormal return, which is defined as the difference between the actual return and the expected return (usually on a listed share). The expected return is the normal return calculated off a selected model. The abnormal return calculated around the event date is indicative of the extent of market inefficiency, as abnormal returns should not exist in an efficient market (Kothari and Warner, 2004).

The commonly accepted event study flow, also used in most academic studies on which this study is based (*e.g.* MacKinlay, 1997, and Mokale, 2010), is as follows:

4.1.1 Identify the event

The event (defined as Day_0 in the event study) was identified as the date a director's trade in the shares of his/her own JSE listed company was announced on the JSE's SENS platform. There was a choice of two event dates for each transaction: the date of the actual director trade, and the date of the trade being publically announced through SENS. Using the former would statistically address whether or not directors earn abnormal returns from insider trades, whereas using the SENS announcement date would statistically investigate if outsiders can earn abnormal returns by mimicking insider trades when reacting on this information immediately. Either choice would, however, indirectly answer both questions, especially as the JSE requires a firm to disclose directors' inside trades within 48 hours. In the analysis of the results it was therefore implicitly assumed

that director trades took place between day -2 and day -1 in relation to the event date (SENS announcement date). To test this assumption, the SENS announcement and transaction dates for the sample of 1,026 director transactions were compared. Outliers were removed, namely where the SENS date was listed before the transaction date (5 transactions), and where the SENS announcement date was greater than 20 days post the transaction date (31 transactions). For the remaining 990 transactions (96.5% of the sample), the SENS announcement date occurs on average 1.96 days post the transaction date[22]. In line with this the transactions date will be assumed to take place 2 days before the SENS announcement date (defined as Day_0).

4.1.2 Define the event window

The event window was made up of two periods, namely the period before the trade, and the period post the trade. The pre-event window encompassed the 20 days preceding the event day, *i.e.* Day_{-20} to Day_{-1}. The post-event window encompassed the 20 days post the event day, *i.e.* Day_1 to Day_{20}. According to MacKinlay (1997), including a pre-event window allows for the analysis of the pre-event returns, and may help in understanding whether outsiders received inside information prior to the event.

The present study considered the potential short term abnormal returns earned on director dealings, and hence the post-event window was set at 20 trading days, which is in line with the South African study done by Mokale (2010), but did not consider the long term, as done by Mordant and Muller (2003) and van der Plas (2007). By restricting the post-event window to a relatively short period, external market forces are largely removed from the results, and the test statistics' sensitivity to the assumptions concerning the return generating process is reduced (Kothari and Warner, 2004, and Ismail, 2016).

[22] Of the 990 remaining transactions, 701 less than two days from transaction to SENS announcement, 126 take three days, 110 take four days, and 24 take 5 days

4.1.3 Estimation window and returns estimation

MacKinlay (1997) suggested using either the *Constant Mean Return Model* or the *Market Model* to determine the expected return of the company in relation to the market. The Constant Mean Return Model uses a constant expected return for the firm relating to the period under review, which is in turn compared to the actual return observed to calculate the abnormal return per company. The expected return for each company is calculated separately, with this expected return remaining constant for the period. This does not have much relevance to reality. The Market Model, however, uses a linear relationship between the return of the market and the return of the individual company. The model uses an estimation period to calculate an approximation for the expected (normal) returns to be used in the calculation of the abnormal returns earned by directors. As the Constant Mean Return Model is rather restrictive, it was decided to use the Market Model for the analysis as it allows for the individual security's responsiveness to insider trades, as measured by beta. This is in line with international studies, including those of Ek and Erlinder (2015), Neill et al.,(2008), and Cheuk et al. (2006).

In this study the Market Model was therefore used to regress each share's returns individually against the All Share Index (ALSI), used as proxy for the market return, to calculate the share's beta value. This in turn is used to calculate the expected (normal) return for each of the companies in the sample.

Although most earlier studies made exclusive use of Market Model, a single factor market model, Van Rensburg and Slaney (1997) demonstrated that a two-factor Arbitrage-Pricing Theory (APT) model, consisting of the returns of the JSE's resource and financial-industrial indices, may better represent the return generating process of the South African market (Van Rensburg, 2002). However, previous South African studies (see, for example, Kruger and Toerien, 2014, and Ismail, 2016) found little significant difference in the results obtained from the Market Model and APT approaches. In view of this, and due to its simplicity and wide use in the academic field, it was therefore decided to use only the Market Model in this study.

It is important to select an estimation window that is of sufficient length in order to best calculate the beta for each firm. MacKinley (1997) suggested 120 days as the minimum

for an estimation window, and most studies use anything from 180 to 250 days including SA studies by Nair (2008) and Ismail (2016). In this study 220 days was used, with the estimation window therefore running from -230 to -21 days in relation to the event date.

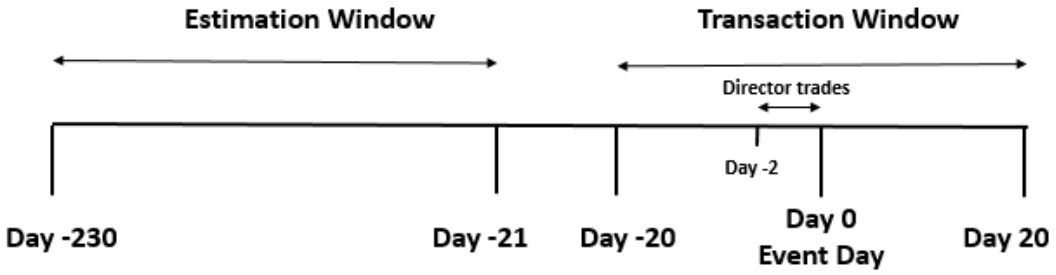


Figure 2: Estimation and Transaction Window

Figure 2 summarises Sections 4.1.1 – 4.1.3 of the methodology section. Day 0 is the event day (SENS announcement date), and day -2 the assumed director's transaction date (48 hours before the SENS announcement date required by the JSE listing requirements). The estimation window, day -230 to day -21, was used to calculate a separate beta for each company (by regressing the total daily returns of the company against the benchmark), which was thereafter applied to the market's return going forward to calculate the expected returns of the companies during the transaction window. This is done at each event date, and thus a rolling beta is calculated, which is more representative of current economic and market conditions. The expected return is then compared to the actual return of the firm's share to get the abnormal return for the company's share over the transaction window period. The transaction window is broken up into two sections, the pre-event period, which demonstrates the share's behaviour before the director traded, and the post-event period, which is used to calculate the potential abnormal returns earned by outsiders mimicking director's trades (director's abnormal returns earned are calculated from day -2 until day 20).

The methodology section will next discuss how this study respectively approached the issues of sales *vs.* purchases, market capitalisation, and industry classification, before discussing the calculations used.

4.1.4 Purchases vs. Sales

The majority of the international and South African[23] studies dealing with director dealings have analysed the differences in abnormal returns earned by purchases and sales transactions, respectively, as they are expected to behave differently (buy transactions being seen as possibly a stronger signal than sell transactions, as explained earlier). The current sample comprised of 463 purchases and 563 sales transactions. It must be noted that where two transactions in the same firm occurred on the same day only the first, ranked by size, was included. This was done before arriving at the sample of 1,026 transactions, and may have meant the filtering out of certain purchases/sales.

Sale transactions (55%) outnumbered purchase transactions (45%), in line with previous South African studies done by Ismail (2016), Mokale (2010) and Nair (2008), where sales respectively made up 58%, 62% and 78% of the total transactions. This is contrary to many international studies, where purchase transactions were more common. For example, in the Swedish market Ek and Erlinder (2015) found that 58% of transactions were purchases, Neil, Sadeghi and Watts (2008) found a staggering 86% of transactions were purchases in the Australian marke,t and finally Seyhun (1985) found, in arguably the most comprehensive US study to date, that 70% of the 59,148 transactions analysed were purchases. Obviously these ratios are to some extent dependent on the period over which a study is conducted (*i.e.* bull markets *vs*. bear markets), but the contrast remains interesting.

4.1.5 Market capitalisation

The study followed the JSE guidelines for categorising the JSE Main Board according to market capitalisation, as follows: i) The largest 40 firms by market cap, as defined by the Top 40 Index (J200), ii) The next largest 60 firms by market cap, as defined by the Mid Cap Index (J201), iii) The following 60 firms by market cap, as defined by the Small Cap Index (J202), and iv) The remaining shares listed on the Main Board, but not included in the All Share Index (J203) are included in the Fledgling Index (J204).

[23] International studies include Pope et al., (1990) and Seyhun (1986) and South African studies include Ismail(2016) and Mordant & Muller (2003) to name a few in a long list.

A number of the firms from the data set were not classified by the JSE. To better analyse these firm's director dealings it was necessary to allocate the firms to a size classification. The size allocation was done based on the market capitalisation of the firm at the previous quarter end, with the thresholds used based on the market capitalisations of firms already allocated to size classifications on the JSE. Firms were allocated as follows: (i) greater than R20 billion – Top 40, between R5 billion and R20 billion - Mid Cap, Between R2.2 billion and R5 billion – Small Cap, and below R2.2 billion – Fledgling. This resulted in a further 38 transactions being assigned: 2 to Top 40, 31 to Mid Cap, 3 to Small Cap and finally 2 to the Fledgling classification.

Table 5 – Director transactions broken down by company size

	Top 40	%	Mid Cap	%	Small Cap	%	Fledgling	%	N/A	%	Total
2007	64	**21%**	59	**13%**	20	**11%**	17	**10%**	14	**8%**	**174**
2008	27	**9%**	53	**11%**	21	**12%**	6	**5%**	17	**14%**	**124**
2009	50	**16%**	78	**17%**	22	**12%**	6	**4%**	7	**4%**	**163**
2010	49	**16%**	93	**20%**	35	**20%**	0	**0%**	0	**0%**	**177**
2011	69	**23%**	108	**23%**	43	**24%**	3	**1%**	0	**0%**	**223**
2012	47	**15%**	73	**16%**	38	**21%**	6	**4%**	1	**1%**	**165**
Total	**306**		**464**		**179**		**38**		**39**		**1026**

Due to the length of the sample window a small number of firms may have migrated between indices as a result of relative market cap changes over the period. This was noted and the sample was revised quarterly to ensure that any firm that did not meet the requirements for one of the Indices, Small, Medium and Top40, was moved to the applicable Index during that quarter.

4.1.6. Adjustment for thin trading:

Due to the issues surrounding small cap firms and its effects on abnormal return calculations, the majority of studies dealing with insider dealings removed small cap firms from their population. This is, for example, the case with the prior unpublished SA studies of Ismail (2016), Mokale (2010) and Nair (2008). Other studies, however, have focused solely on small cap firms, including the international study by Hamill, Mcilkenny and Oping (2002). In accordance with the studies by Ek and Erlinder (2015) and Gregory, et al., 1994), the current study investigated the link (if any) between a firm's market cap and abnormal returns earned by directors, and hence thin trading is a pertinent factor to the study.

On a calculation level, the effect of thin trading can be seen on the beta calculation. The beta used in the market model is calculated through the regression of the stock's past returns against the market's past returns; however thin trading results in an erroneous beta being calculated, which will result in an incorrect expected return for the share being forecast (Sercu, Vandebroek, and Vinaimont, 2008). A share that does not trade on a particular day may reflect a zero return, but this is clearly in such a case not due to the underlying market fundamentals, but rather to the share price being carried forward from the previous day unchanged (Ryan, 2007). The resultant error causes the betas of active stocks to be biased upwards, whilst thinly traded stocks have a negative bias (Scholes and Williams, 1977).

Various models have been introduced to try mitigate the effect of thin trading on the beta calculation. Stroll and Whaley (1990) suggest using longer holding periods; this does not reduce the noise created by thin trading, but does increase the true returns, thus providing a better signal-to-noise ratio.

Dimson (1979) suggested the use of multiple regressions in an attempt to reduce the effects of thin trading. The simple market model calculates beta using ordinary least squares simple regression. The expected value for the share is calculated using a weighted average of a sequence of true prices from the present and past. Dimson explains that to counter the issue of thin trading one must run multiple regressions of the share returns against lagged, matching and leading market returns. The beta is then calculated as an aggregate of these slope coefficients and in so doing 'smoothes' out the explanatory variable, the market return, over the three periods (Ryan, 2007). However, Dimson (1979) made use of monthly share and market returns in the calculation of beta, whereas it was decided for this paper to make use of the available daily stock returns as has become standard for short-term event studies since the mid-1980s (Sorokina, Booth, and Thornton, 2013). Therefore, this study rather individually removed those shares that failed to meet minimum liquidity criteria from the sample, which differs from prior South African studies, which tended to remove small cap shares as a group, without any reference to actual liquidity over the investigation period. As a result, this study retained sufficient small cap-related transaction to be able to address the research question mentioned above. In terms of the process followed, as was discussed in the Section 3.2, a

threshold was therefore set where any transactions with 20% or more zero daily total returns in the estimation window (day -230 to -21 relative to the event) were removed from the sample.

Market proxies used in analysis:

In addition to regressing the share returns against the ALSI, they were regressed to the applicable Index based on the company's market cap. The Indicies included the J200 (Top 40 Index), J201 (Mid Cap Index), J202 (Small Cap Index) and the J204 (Fledgling Index). For example, if a firm was classified as a Small Cap firm by the JSE, its share returns were first regressed against the ALSI for analysis, but in addition also against the J202 for additional insight.

Using the ALSI as a market proxy for all four size classifications allowed for comparisons to be made between the abnormal returns earned by both directors and outside investors, for each size classification. This aproach takes the view that the ALSI is the appropriate market proxy, and assumes that an investor would be indifferent as to which one or combination of these categories to invest in. This was used to identify which size category of companies, by market cap provide the greatest abnormal returns potential for outsiders mimicking director trades.

Share returns were also regressed against their associated market cap indices, in order to identify more accurately the abnormal returns for directors, and potential abnormal returns for outsiders, earned against similar sized companies. In other words, in this case the market (and hence market proxy) was considered to be the specific peer-group of companies by size. Practically, this implies a test for abnormal returns to outside investors who mimic director trades only within a previously selected company size (market cap) category.

4.1.7 Industry classification

The second major addition made to the South African literature on insider trading by this study is the effect of the firm's industry classification, as per the JSE, on the ability of insiders to earn abnormal returns. As discussed under the introduction section, there are no South African studies, and as far as the author is aware, only two international studies,

Cheauk, Fan and So (2006), and Ek and Erlinder (2015), that investigated the effect of the firms industry classification on the ability for directors to earn abnormal returns by trading in their companies' shares.

There may be an effect on the abnormal returns experienced by respective director trades in each of these JSE sectors due to their relevant sector classification. Therefore the sample was split according to their industry classifications as per Ek and Erlinder's (2015) study. Thereafter the realised returns earned by the insiders were compared to the expected returns earned based on the market return (J201). The ICB industry classification used in Ek and Erlinder's (2015) study included the following groups: financials, telecom, basic materials, consumer services, industrials, technology, consumer goods, oil and gas and health care (only 9 groups were included as utilities only comprised of 2 companies in their sample).

The above breakdown was also used to classify all the firms in the current sample of director dealings.

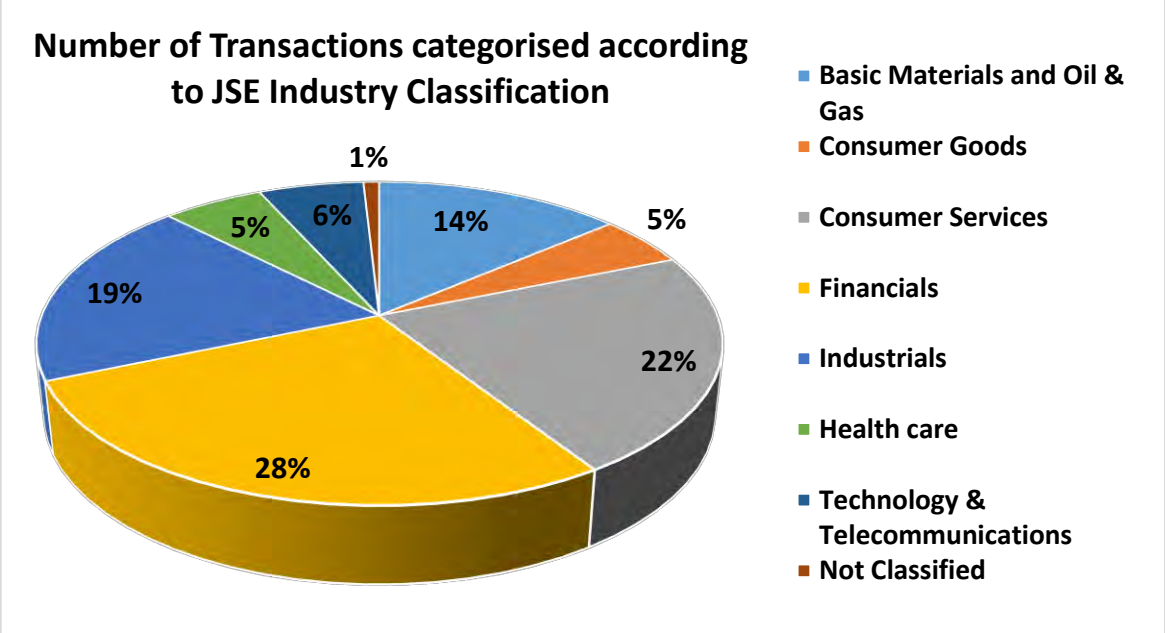


Figure 3: Director transactions broken down by the company's Industry Classification

4.2 Calculations:

The first step was to predict the normal outcome (normal returns) during the event window in the absence of the event**.** The normal returns were calculated using the actual share and All Share Index (ALSI) returns (in addition to the various indices used for the size effect analysis).

Thereafter, the abnormal outcome within the event window was calculated as the actual return earned by the director's trade less the predicted (or normal) return earned during the event window. The predicted (or normal) return is the expected return as if no event had occurred.

The abnormal return was calculate by comparing the expected return of the share to the actual return of the share. The expected return is calculated by using the Market Model to regress the share return against the market return within the estimation window. The cumulative average return was calculated as the sum of the actual return earned by the director's trade less the sum of the market's return.

A step by step breakdown of the calculation of the cumulative average abnormal returns is presented below.

i) **Total share returns:**

The share's total daily return was calculated by dividing its closing total return index value for day_{t+1} by its closing total return index value for day_t. The resultant value gave the total daily share return, consisting of both the index price movement and any dividend declarations.

$R_{it} = (R_t/R_{it-1})$ **(Equation 2)**

Where R_{it} is the total actual return for the company for the period *t*, R_t is the actual share index value at time *t* (the current day), and R_{t-1} is the actual share index at time t-1 (the previous day). *t* is the time/period used in the calculation, and *i* represents the company under investigation.

ii) **Cumulative actual share returns (CASR):**

The cumulative share return is then calculated as the daily total returns summed over the event window.

$CASR_t = \sum n \; R_{i,t}$ **(Equation 3)**

iii) **Actual market returns:**

The total daily market return was calculated by dividing the ALSI's[24] closing index value of day_{t+1} by the ALSI's closing index value of day_t.

$R_{mt} = (R_{mt}/R_{mt-1})$ **(Equation 4)**

iv) **Calculation of Parameters, α_j and β_j:**

The estimation window, day -230 to day -21 in respect to the event day 0, was used to calculate the parameters, α_j and β_j, to be used in the market model.

$R_{jt} = \alpha_{jt} + \beta_j R_{mt} + \epsilon_{jt}$ **(Equation 5)**

Where R_{jt} is the daily total return for the company j for the day *t,* α_{jt} is the estimated intercept, and B_j the estimated market risk for the company j (The sensitivity of the company's share price to the market return). The daily actual return for the ALSI[25] for the period *t* is represented by R_{mt}. ϵ_{jt} is the error term for the day *t.* This is assumed to be normally distributed with a mean of zero and a constant variance σ_j^2.

v) **Abnormal returns:**

The abnormal return for each firm were then calculated daily for the 20 days preceding and succeeding the event by comparing the actual share's total return to the estimated share's total return, based on the Market Model predicted return using the beta and market return described above.

$AR_{jt} = R_{jt} - \alpha_j - \beta_j R_{mt}$ **(Equation 6)**

[24] For the size analysis section of this study this was done for the J200, J201, J2202, J203 and J204.
[25] For the size analysis section of the study the ALSI (J202) was replaced by the relevant size benchmark, J200, J201, J202 or J204.

Where AR_{it} is the abnormal return for period *t*, and R_{it} the actual total return for the firm for the period t (Refer to **Equation 2**). β_j represents the estimated market risk for the company *j* (the sensitivity of the company's share price to the market return), and R_{mt} is the daily actual return for the ALSI for the period *t* (refer to **Equation 4**). The time/period is denoted by *t*.

vi) **Average abnormal returns:**

The average abnormal return (AAR) across all the firms for each day was calculated as:

$$AAR_t = \left(\frac{1}{N}\right) \quad \sum_{i=0}^{N} ARjt \qquad \textbf{(Equation 7)}$$

Where AAR_t is the average abnormal returns for all the shares during period *t, N* the number of transactions in the sample[26], and AR_{it} the abnormal return for period *t* (Refer to **Equation 6**).

vii) **Cumulative average abnormal return:**

These are a cross section average of the cumulative abnormal returns, and are the sum of all the single abnormal returns. They were calculated as the sum of the abnormal returns for all the companies in the sample over the chosen period[27].

$$CAAR_t = \sum_{t}^{D} AARt \qquad \textbf{(Equation 8)}$$

Where $CAAR_t$ is the cumulative average abnormal returns for all the shares during period *t, D* the day in the period which the average abnormal returns are being calculated for, and AAR_{it} is the average abnormal return for period *t* (refer to **Equation 7**).

4.3 Statistical tests of significance:

In accordance with most studies in this field, the t-test was used to test for statistical significance.

The two-sided t-test requires the observations to follow a normal distribution. The null hypothesis (H_0) states that insiders are unable to earn abnormal returns (CAAR), as these are not significantly different to zero, whilst the alternative hypothesis (H_1) states that

[27] The total sample comprised of 1,026 transactions which were further sub divided into purchases (463) and sales (563) transactions, and yet further by firm size and firm industry classifications.

insiders are able to earn abnormal returns significantly different to zero. A two-sided t-test was done at the 5% significance level, as the abnormal returns could be either positive or negative. The test statistic is calculated as follows:

$$t_{CAAR} = CAAR/(\sqrt{T_2 - T_1}\, S_{AAR})$$

Where t_{CAAR} is the T-Stat. CAAR is the cumulative average abnormal returns for all the shares during period *t*. $\sqrt{T_2 - T_1}\, S_{AAR}$ is the standard deviation of the sum of AARs for all the shares during period *t.*

The following section, Chapter 5, will report and discuss the results of the study.

5. Results and Discussion

As was previously stated, the purpose of the study was twofold: firstly to identify if directors earned abnormal returns by trading in their firms, and secondly whether outsiders could mimic these director trades to earn an abnormal return themselves. Abnormal returns from directors are centred around day -2, the assumed average transactions date, while the earliest outsiders could act on the director's trade is day 0, the SENS announcement date. The results of interest are the CAARs earned from day -20 through to day 20 (the event window). The discussion of the results is divided into three sections, as follows:

- The comparison between CAARs resulting from director purchases *vs.* director sales, as well as the mimicking thereof,
- The effect of company size on the CAARs resulting from director trades, as well as the mimicking thereof, and
- The effect of company industry classification on CAARs resulting from director purchases *vs.* director sales, as well as the mimicking thereof.

5.1 Purchases vs. Sales

As done in the majority of director dealing studies the starting point for discussing the empirical findings is that of purchases vs. sales.

5.1.1 Combined Purchases and Sales

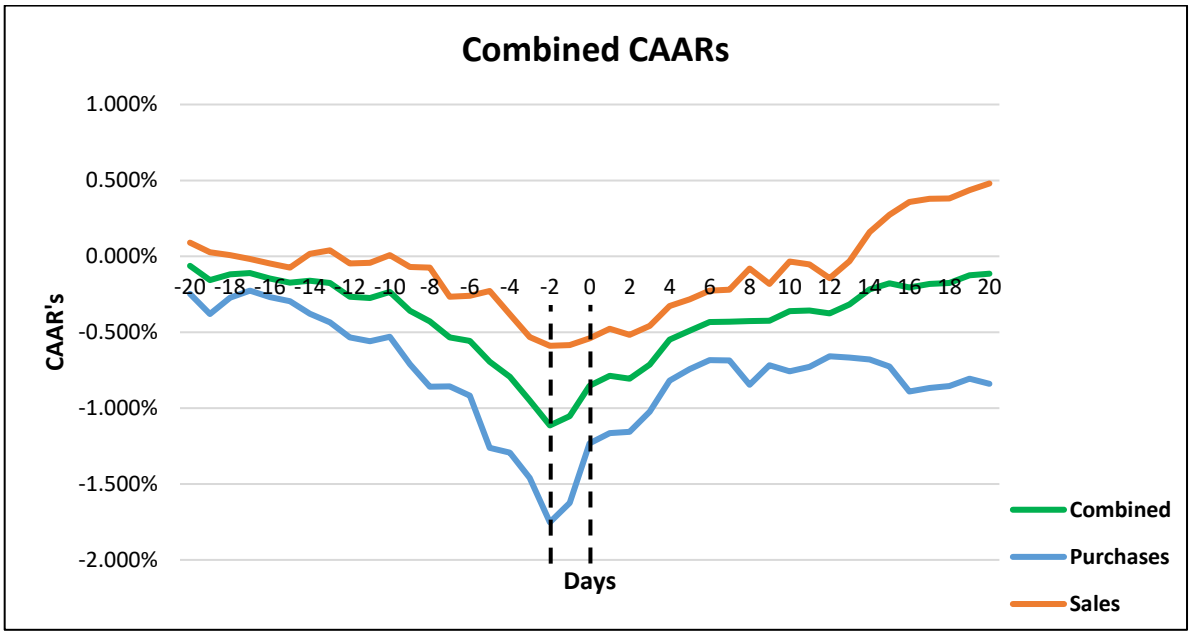


Figure 4: CAAR's for Director Purchases and Sales Combined

Figure 4 shows the combined CAARs earned for directors' sales and purchases. Abnormal returns earned from directors' sale transactions have been multiplied by -1 and added to those of directors' purchase transactions to get the combined CAARs. A negative purchase CAAR before day -2[28] does not signify a loss for a director, rather it shows the negative CAARs the director avoided by not holding the share until day -2. For sales the CAARs are inverted (due to multiplying them by -1, for this graph alone) and are therefore positive leading up to day -2 in Figure 4, which signifies directors were able to earn positive abnormal returns, while holding the share and avoiding the subsequent losses by selling the shares at day -2. Post day -2 an increasing CAAR signifies positive abnormal earnings for the director.

[28] Going forward it is assumed director trades take place on day -2 with directors earning the CAAR on day -2 as if they invested at the start of the day (48 hours pre the SENS announcement which occurs on the morning of day 0). By implication outsiders are able to trade on the information at the start of day 0 and earn the CAAR on day 0.

All three (combined, purchases and sales) CAARs follow a similar trend line, with directors transacting at day -2 and earning positive abnormal returns from day -1 onward. The abnormal returns level out for purchases after day 9. However, this is not the case for abnormal returns earned on sales, resulting in the combined CAARs trend line continuing upward until the end of the event window. There are abnormal returns available for outsiders mimicking both purchases and sales, with the combined abnormal return available to outsiders being 0.94% (an annual equivalent of 17.62%) in the 20 days following the event day. The possible abnormal returns for outside investors mimicking director trades are statistically significant throughout the post event date period at both the 5% and 10% significance levels (see Table 6).

Table 6: Significance of Outsider Investors CAARs for Combined Transactions

	T stat	P Value	5% Significance Level	10% Significance Level
Combined				
0-5	2,93	0,03	Significant	Significant
6-10	9,93	0,00	Significant	Significant
11-15	8,48	0,00	Significant	Significant
16-20	14,59	0,00	Significant	Significant

5.1.2 Purchases

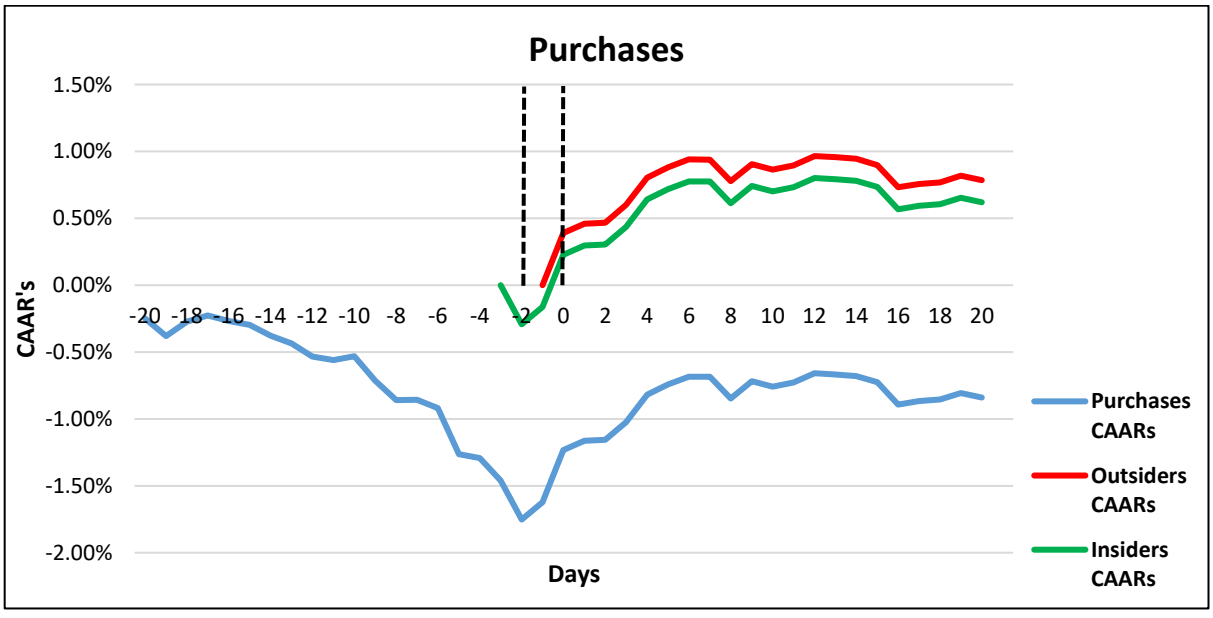


Figure 5: CAAR's for Director Purchases

Figure 5 shows the CAARs earned for purchases. Directors are assumed to trade on day -2, with outsider investors able to mimic these trades on day 0, the event date. The period before day -2 signifies the movement in total returns of the companies before the directors purchase the shares. It is important to note that the point corresponding to day -2 in Figure 5 represents the CAAR at the end of day -2, and not the return at the start of day -2, hence the reason for an abnormal return being recorded on day -2 for directors (the green line in Figure 5 beings at 0% for the close of day -3). The total returns decline sharply from day -17 until day -2 where they reach -1.75%. Directors trade at the start of day -2, earning the negative AAR on day -2, however this then turns positive from day -1, increasing until day 10, where after CAARs remain relatively flat with a slight downward trend (ending the event window at -0.84%).

The change in the direction of the CAARs on the day of the director purchase (day -2) can indicate one of two things - either (i) directors are able to use their superior inside information to time the market nearly perfectly, thus allowing them to earn abnormal returns prior to this information being made public (Uylangco et al., 2010), or (ii) the private information of the director's trade is leaked to the market prior to the SENS announcement made on day 0, allowing outsiders to immediately mimic directors' purchases in the belief (correct or not) that they convey superior information on the prospects of the firm.

As discussed above it is important to note that the point corresponding to day -2 in Figure 5 represents the CAAR at the end of day -2, and not the return at the start of day -2. What is therefore interesting to note is that day -2 is the lowest point in the CAAR line, implying that directors still earn negative AARs for day -2, and that positive AARs only commence from day -1 onwards. If it is true that a director's trade is leaked to the public, this one day delay before the share price increases could be the result of the time it takes for this information to get to the market, and for outside investors to react to it. Another reason for the change in the CAARs direction only after day -2 is that the change in CAARs is due only to momentum trading and without the momentum provided by outside investors, directors would not be able to earn abnormal returns (Givoly and Palmon, 1985).

As shown in Figure 5, outside investors, by mimicking directors' purchase transactions as soon as they are made public (day 0), are be able to earn CAARs of 0.78% between day 0

and day 20 (an annualised figure of 14.54%), with the possibility of earning a maximum of 0.97% if they were able to exit the position following day 12. The abnormal returns are statistically significant for outside investors mimicking director's share purchasing across all four (see Table 7).

Table 7: Significance of Outsider Investors CAARs for Purchase Transactions

	T stat	P Value	5% Significance Level	10% Significance Level
Purchases				
0-5	2,64	0,05	Significant	Significant
6-10	3,56	0,02	Significant	Significant
11-15	9,02	0,00	Significant	Significant
16-20	4,10	0,01	Significant	Significant

5.1.3 Sales

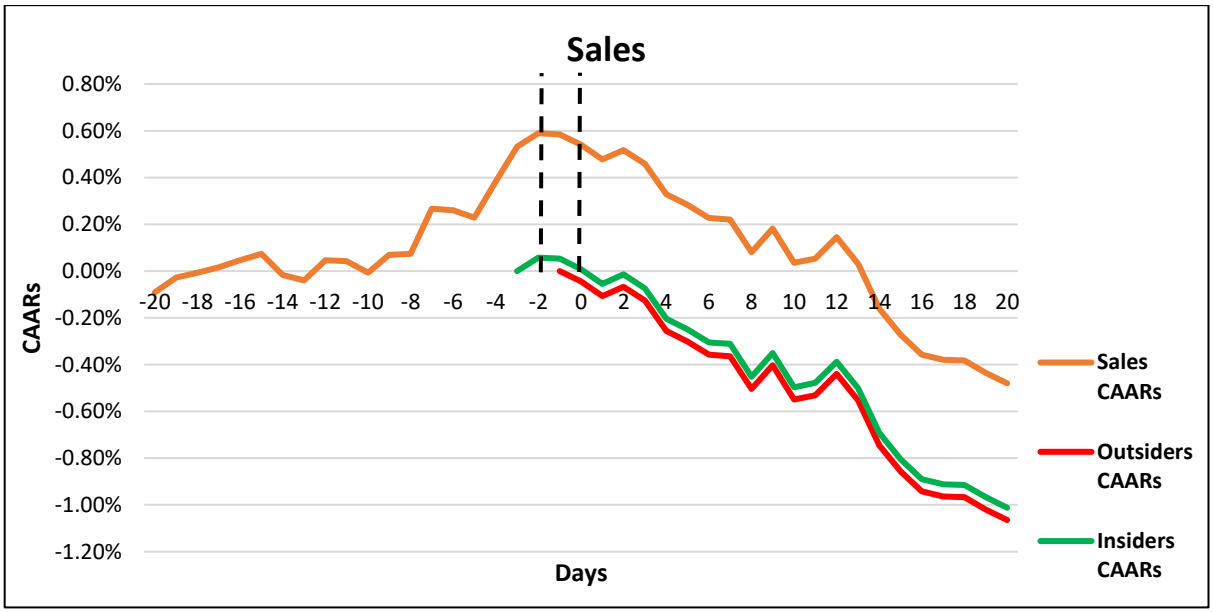


Figure 6: CAAR's for Sales

Days -20 to -3 represent the returns earned by directors while holding the share of their company, with directors selling the share on day -2. Between days -20 and -8 the sale transactions' CAAR fluctuate between 0.07% and -0.09%, before a strong increase between days -7 and -2, which peaks at 0.59% on day -2. As was the case for the purchase transactions, a change in direction of the CAARs is found after day -2. The negative trend in CAARs from day -1 reflect the losses directors avoid by selling their shares before their

total returns decline. Outsiders are able to sell their shares, in line with the director's trade on day 0, and negate the fall in CAARs as signified by the red line in Figure 6. As was the case for purchase transactions, (i) outsiders are assumed to trade on the belief that directors have more insight and are aware when a firm's share price is likely to fall due to adverse information, and (ii) the CAARs shift direction before the news of the director's trade becomes public knowledge by means of a SENS announcement on day 0.

The graph indicates that directors are able to time their trades, selling their shares when the CAARs are at their second highest (a CAAR of 0.53% from day -20) and before they fall post day -2. After day -2, the sale transactions' CAARs are on a clear downward trajectory throughout the event window.

Outsiders would best be served mimicking the directors' sale trade immediately, as the information becomes available, as the CAARs continue to fall post day 0, falling significantly post day 3, with CAARs of 0.33% and 0.22% at days 3 and 4 respectively. By mimicking directors' trades outsiders are still able to earn healthy abnormal returns, despite the two day delay in director trade information becoming available to them. In line with previous studies done by Mordant and Muller (2003) and Pope et al. (1990), it appears that director sales provides a greater opportunity for outsiders to earn abnormal returns than director purchases, yielding a possible abnormal return of 1.06% (annualised return of 20.20%) (either through short selling, or through the avoidance of losses), compared to a return of 0.78% (annualised return of 14.54%) for purchases. The abnormal returns are only not significant at the 5% significance level for outsiders mimicking director's sale trades for the day 0 to 5 and 6 to 10 day periods, otherwise they are significant.

Table 8: Significance of Outsider Investors CAARs for Sale Transactions

	T stat	P Value	5% Significance Level	10% Significance Level
Sales				
0-5	2,26	0,07	Not Significant	Significant
6-10	2,38	0,08	Not Significant	Significant
11-15	3,37	0,03	Significant	Significant
16-20	15,14	0,00	Significant	Significant

5.2 The link between company size and director dealing CAARs

Unlike prior South African studies, this study considered the effect of the firm's size on the abnormal returns earned. Each size classification (Top 40, Mid Cap, Small Cap and Fledgling) will be looked at separately in turn, with each discussion split into two sections: (**1**) where the firms returns are compared to that of the ALSI to calculate the beta and abnormal returns, and (**2**) where the firms returns are compared to the Index corresponding to the firm's size classification on the JSE to calculate the beta and abnormal returns. The findings from each step will be compared to see if they differ. Part 1, as defined above, will directly compare the abnormal returns earned by directors across the four size categories, which is made possible by keeping the benchmark constant. Part 2 will attempt to identify whether an outsider wishing to invest in a specific one of the four size sectors will be able to earn abnormal returns by mimicking director transactions within that specific size category. This is done by using the relevant size sector index as market proxy when determining share betas.

5.2.1 Using the ALSI as a market proxy

By using the ALSI as a market proxy the results of each classification can be compared to identify which provides the greatest abnormal returns to directors and possibility for outsiders to mimic. Because the Top 40, Mid Cap and Small Cap groups were found to behave quite differently to the Fledgling group, the former three are discussed first.

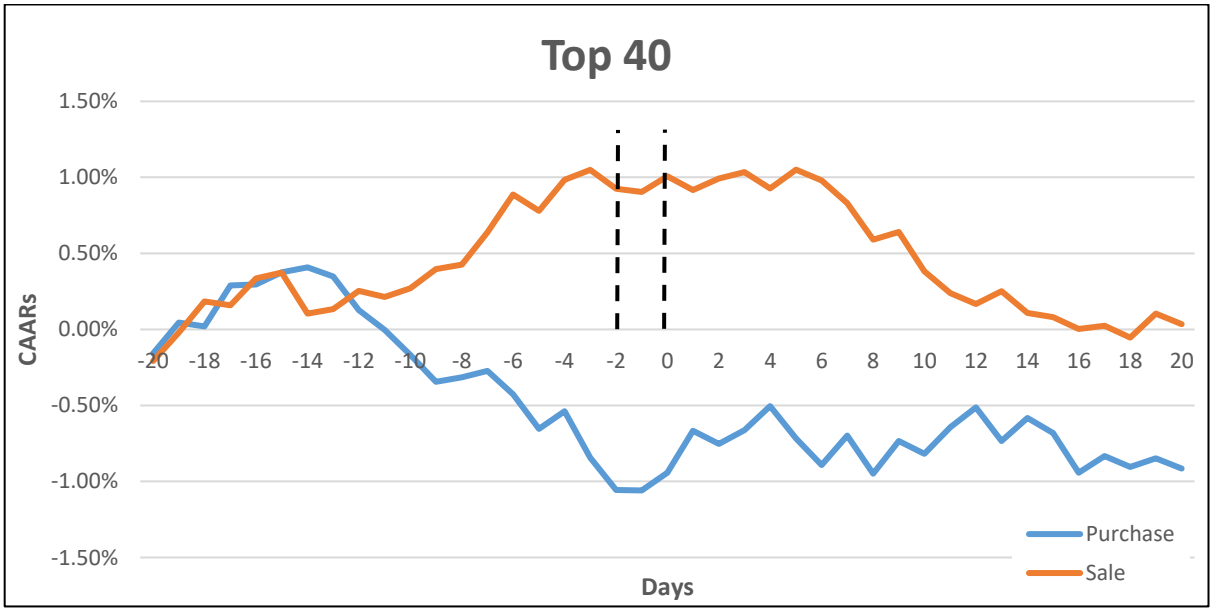


Figure 7: CAAR's for Top 40 firms (ALSI used as market proxy)

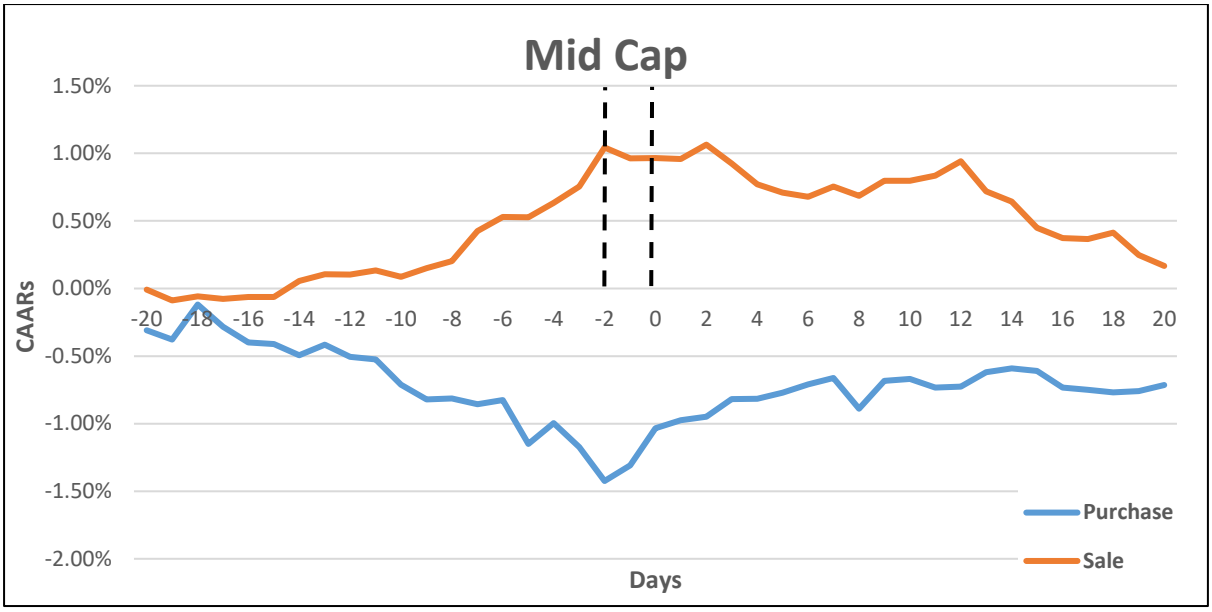


Figure 8: CAAR's for Mid Cap firms (ALSI used as market proxy)

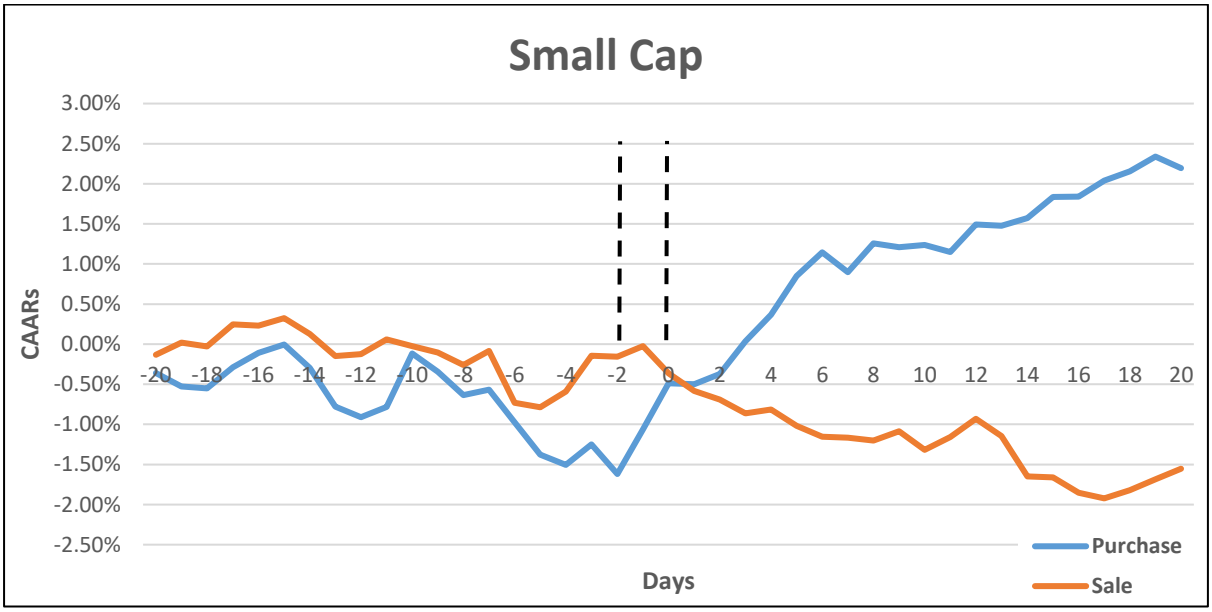


Figure 9: CAAR's for Small Cap firms (ALSI used as market proxy)

a) Purchases

The Top 40, Mid Cap and Small Cap purchase transaction CAARs graphs (Figures 7, 8 and 9) follow a similar trend to that of the total purchase transaction CAARs graph (figure 5). These three graphs show a general decline in CAARs until day -2, before reversing from day -1 onward. This trend, however, appears increasingly pronounced as one moves down the size categories, and as a result the positive AARs earned by directors vary according to the size of the companies. Directors trading in Mid Cap and Small Cap companies earn their biggest

abnormal returns on the two days (day -1 and 0) following their purchase: 0.39% and 1.13% respectively. Directors of Top 40 firms earn negative abnormal returns for days -2 and -1, and only once their transaction becomes public knowledge on day 0 are positive abnormal returns earned. This could imply that directors of Top 40 firms are more aware of the consequences of being implicated in releasing any non-public information to the public as they, and their company, are more closely followed and any illegal dealings will draw attention and possible prosecution. Directors of Top 40 and Mid Cap companies experience a tapering off of AARs following day 4 and day 3, respectively, culminating in a return reversal for Top 40 shares by day 20. The CAARs associated with Small Cap company share purchases continue to increase throughout the event window, resulting in directors earning 3.44% (71.13% annualised) by purchasing their company's shares on day -2 and holding them until day 20.

All three purchase transactions CAARs graphs indicate the ability for directors to time their purchases (within a day), indicated by the subsequent upward trend in the CAARs graph after the assumed purchase day (day -2), and the opportunity for outsiders mimicking directors' purchases by purchasing at day 0 to earn positive CAARs.

Outside investors purchasing shares in Small Cap companies stand to earn the highest CAAR of 3.25% - an annualised figure of 79.40%. For Top 40 and Mid Cap companies the equivalent numbers are 0.14% and 0.60%, respectively, although for Top 40 companies the CAAR peaks at 0.55% on days 5 and 13. The substantially larger abnormal returns earned for Small Cap firms compared to Mid Cap and Top 40 firms can possibly be explained in terms of Small Cap firms not being as closely monitored by investment managers and other investors, and hence the existence of greater informational asymmetry between the director and the market.

b) Sales

The Top 40 and Mid Cap sale transaction CAARs graphs (Figures 7 and 8) follow a similar trend to that of the total sale transaction CAARs graph (Figure 6), with CAARs increasing between day -20 and day -2 (the assumed date of sale). For Small Cap shares, however, CAARs over this period show a slight declining to flat trend. Directors of Top 40, Mid Cap and Small Cap companies all earn abnormal returns by selling their shares at day -2, and hence avoiding the subsequent decreases in CAARs. To the end of the event window these are, respectively, 1.02%, 0.59% and 1.41% for Top 40, Mid Cap and Small Cap companies. Directors and outsider investors who mimic director sale transactions in the Top 40 and Mid Cap companies

experience a levelling out of CAARs post their transactions, with CAARs plateauing until day 8 and 9 respectively. Outsiders are again able to obtain information from director's trades, earning 0.87% and 0.80% for Top 40 and Mid Cap sale transactions between day 0 and 20. Once again outsiders are able to earn the highest CAARs in the Small Cap classification by mimicking director trades, with the possibility of earning 1.53% (an annualised figure of 30.12%) by selling their shares on day 0.

c) The Fledgling Group

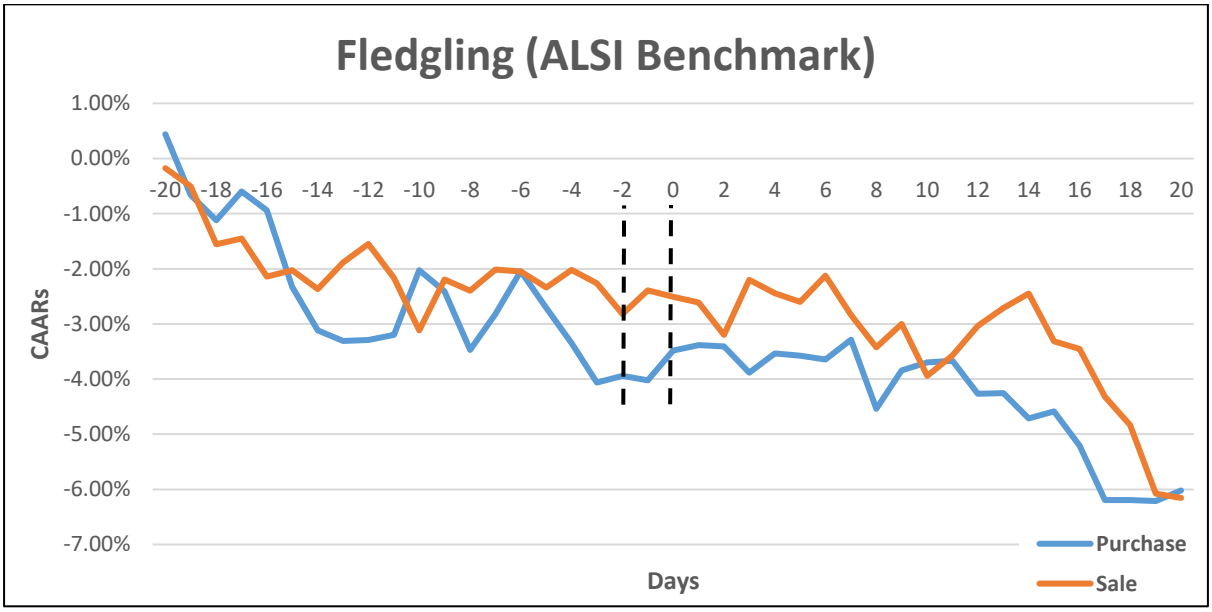


Figure 10: CAAR's for Fledgling firms (ALSI used as market proxy)

The sample of fledgling directors' trades was very small (a mere 20 transactions), and the graph above is therefore included only for the sake of interest. As can be seen, there is no indication of directors being able to time the market, or signalling much useful information to outsiders trough their trades. Other than the small sample size, it is possible that this result could be due to fledgling companies being so risky and young, that even insiders have limited informational advantage.

d) Summary (ALSI used as market proxy)

Table 9- Summary of Director and Outsider's annualised abnormal returns

	Directors (Day -2 to +20)					
	Purchases	**Rank**	**Sales**	**Rank**	**Combined**	**Rank**
Total	10,31%		17,32%			
Size						
Top 40	-1,15%	3	17,39%	3	16,05%	4
Mid Cap	7,56%	2	9,77%	4	18,02%	3
Small Cap	71,13%	1	24,88%	2	112,13%	1
Fledgling	-26,96%	4	83,32%	1	35,51%	2
	Outsiders (Day 0 to +20)					
	Purchases	**Rank**	**Sales**	**Rank**	**Combined**	**Rank**
Total	14,54%		20,20%			
Size						
Top 40	2,52%	3	16,23%	4	19,13%	4
Mid Cap	10,89%	2	14,81%	3	27,20%	3
Small Cap	74,47%	1	30,12%	2	125,17%	1
Fledgling	-29,62%	4	90,04%	1	35,49%	2

Table 9 indicates the annualised abnormal returns available to directors, trading at day -2 and holding the position until day 20, as well as the possible annualised abnormal returns available to outsiders by mimicking the directors' trades at the event date (SENS announcement date). As can be seen, outsiders earn a higher possible abnormal return than those earned by directors across the majority of the sub samples[29]. This could be due to the exact timing of trade, with directors assumed to trade at the start of day -2 (exactly 48 hours before the SENS announcement) throughout the study, whereas in reality it could be anytime within 48 hours before the SENS announcement date. Another reason

[29] It has been assumed in all cases that trades take place in the morning of each day, which would be in line with the timing of the SENS announcements. This would mean that on average directors' and outsiders' returns would begin on day -2 and 0, respectively, due to the assumptions used earlier in the study.

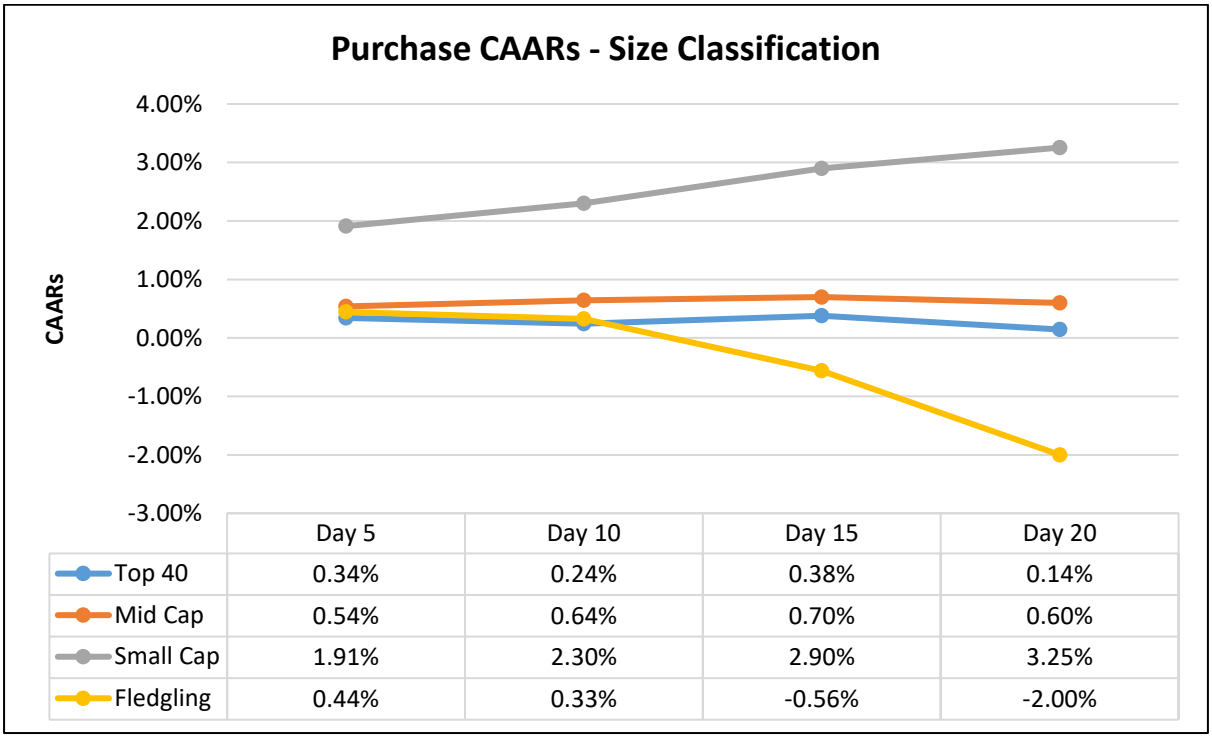
may be due to the momentum of the market, which may take an additional day to react entirely to the director's trade, as the distribution of the information is not perfect (nor should it be, as it is illegal before day 0). This sequence can be practically illustrated using the sub-sample of Small Cap purchase CAARs (using the ALSI as a benchmark) as an example. In this case the AARs are negative until, and including, day -2 (0.37%). However, on day -1 they become positive (0.56%). This one-day lag observed in many of the cases investigated, could be due to news of the director's trade slowly filtering into the market during the course of day -2, allowing outsiders to only trade on this information on day -1, which then drives up the price of the shares and therefore the CAARs, resulting in positive CAARs on day -1. Note that this all occurs before the SENS announcement on day 0. However, outsiders acting on the information at day 0, despite not participating in the positive AARs of day -1, have also avoided the negative AARs of day -2, and therefore only collect the positive AARs earned in the period from day 0 to 20.

With the exception of Top 40 and Fledgling purchases, Table 9 indicates that the South African listed equity market does not appear to be strong form efficient, as directors are able to earn abnormal returns, presumably on the information they have access to as a result of their positions within their firms (Neill et al., 2008). Table 9 also shows that if outsiders were to mimic director trades, they would be able to earn abnormal returns for all the sub-samples, except for Fledgling purchases. This indicates that the South African market is not semi-strong form efficient either, as outsiders are able to earn abnormal returns by basing their investing strategy on that of directors' trades, which are public information as from day 0. These results are pre transaction costs which may alter the findings (Seyhan, 1986).

Director sales transactions provided larger abnormal returns than that of purchases. Directors were able to earn an annualised abnormal return of 10.31% and 17.32%, for purchases and sales transactions respectively between days -2 and 20 (a 23 day period), in line with the UK study done by Gregory et al (1994). The returns available to directors, and possible for outsiders by mimicking director trades, is the highest for Small Cap firms for both purchases and sales, with purchases providing the highest annualised return (71.13% for directors). This is in line with the belief that directors of smaller firms hold more valuable information on the operations and prospects of their firm, and that the

purchase of shares by a director indicates a their belief that the firm is undervalued in relation to future prospects. Directors of Mid Cap firms earn similar abnormal returns for both purchase and sale transactions in their firms. However, directors of Top 40 firms are unable to earn abnormal returns on their purchases (-1.15% annualised for the 22 days after the trade, vs. a healthy 17.39% for sales). This could indicate that in most circumstances directors are not selling their shares for liquidity and tax issues, but rather as a result of private information indicating a potential decline in the share price of the firm. Outsiders would therefore be best served to follow the sales, rather than the purchases, of Top 40 directors.

The summary will now look at the CAARs per 5 day window following the event date, which by implication focuses on the ability for outsiders to earn abnormal returns based on directors' trades, as the event date is the earliest possible date outsiders should be able to mimic these trades.



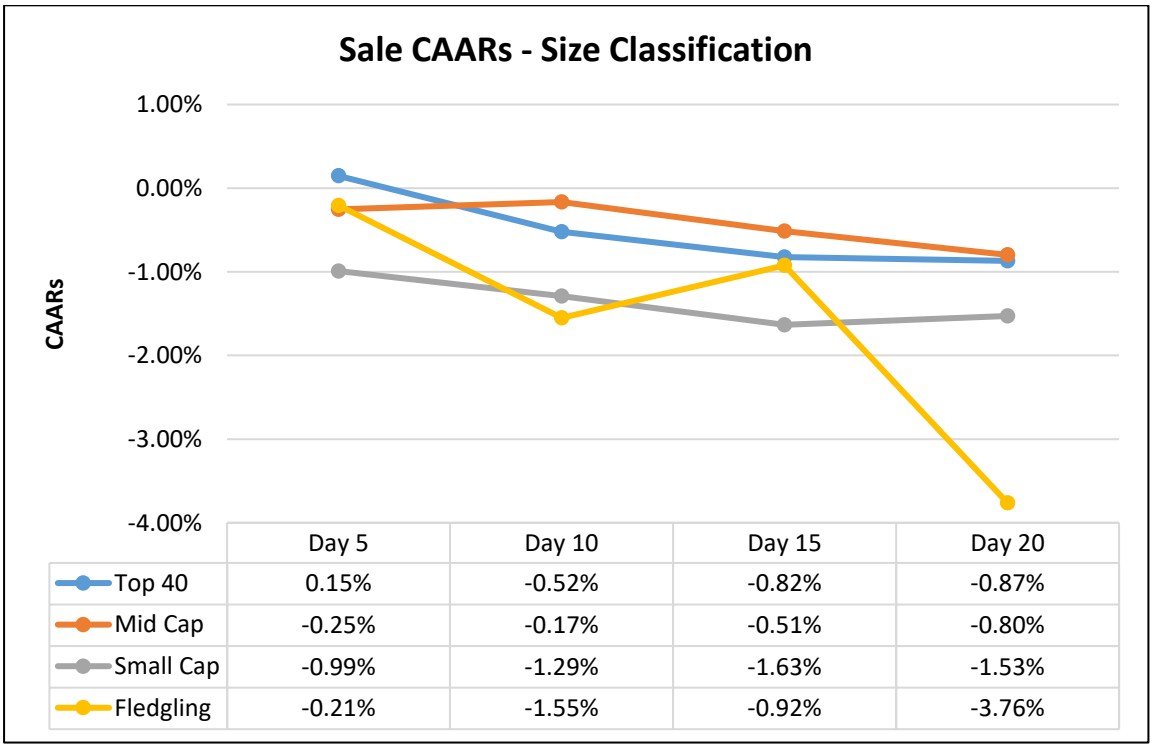
	Day 5	Day 10	Day 15	Day 20
Top 40	0.34%	0.24%	0.38%	0.14%
Mid Cap	0.54%	0.64%	0.70%	0.60%
Small Cap	1.91%	2.30%	2.90%	3.25%
Fledgling	0.44%	0.33%	-0.56%	-2.00%

Figure 11: Purchase CAARs for Size Classification (Outsiders)

Figure 11 indicates which size firms provides the highest CAARs from the SENS announcement date. Across all four intervals (day 5, 10, 15 and 20), Small Cap firm purchase transactions provide the largest opportunity for outsiders to earn abnormal

returns. This is in line with the hypothesis that these firms are not followed as closely by larger asset managers and investors, and that their director trades therefore have greater informational value compared to that of larger companies (Gregory et al., 1997). Similarly, although Top 40 and Mid Cap firm purchase transactions provide a similar CAAR profile, Mid Cap transactions consistently provide higher CAARs across the four intervals. Top 40 firms are generally the most traded of all the firms on the JSE and hence are the most monitored by the likes of investment managers and individual investors alike. This means any information signalled by director's trades is that much less significant (than for smaller firms), as many of the investors have already obtained this information through their own research.

Fledgling firm transactions provide CAARs higher than Top 40 firm purchase transactions from day 0-10, but thereafter declines drastically to -2.00% by day 20. As mentioned previously, this could be due to the very small sample size or the high risk nature of fledgling firms, which could make investing by their directors largely speculative.

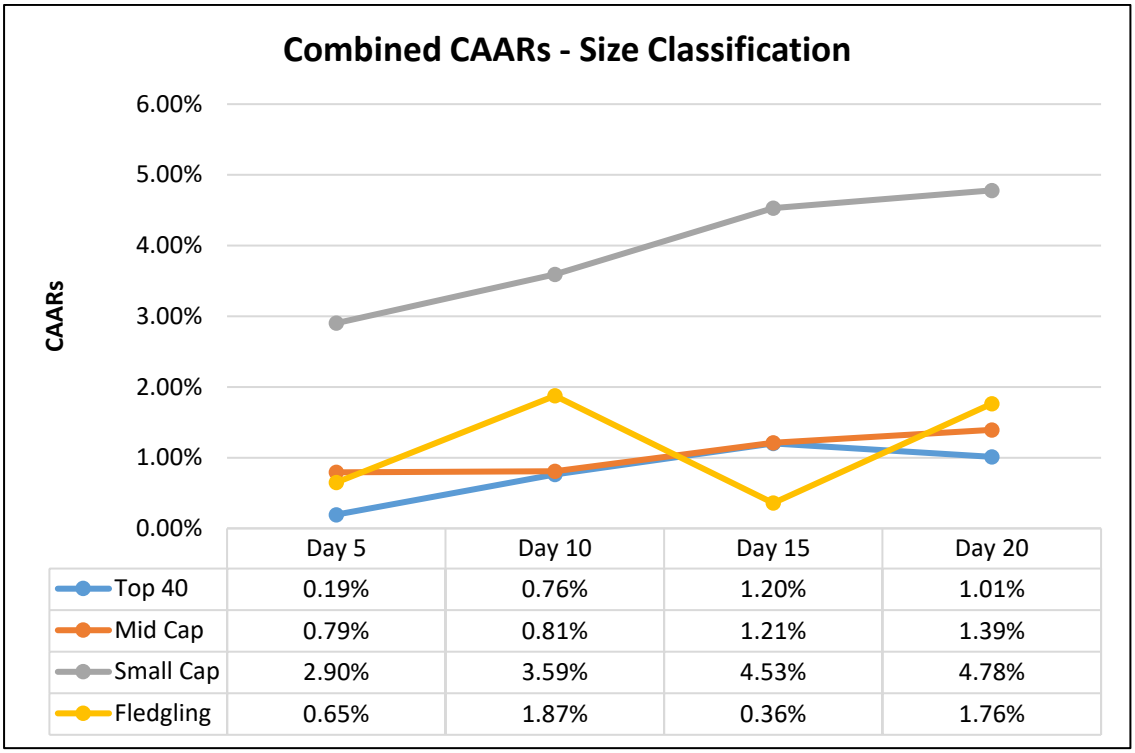


	Day 5	Day 10	Day 15	Day 20
Top 40	0.15%	-0.52%	-0.82%	-0.87%
Mid Cap	-0.25%	-0.17%	-0.51%	-0.80%
Small Cap	-0.99%	-1.29%	-1.63%	-1.53%
Fledgling	-0.21%	-1.55%	-0.92%	-3.76%

Figure 12: Sale CAARs for Size Classification (Outsiders)

Outsider investors for all four sub categories would do well to mimic the sale trades of directors, with Figure 12 indicating directors do hold superior knowledge regarding the

firm and are able to time the selling of their shares before the CAARs fall, for Top 40 and Mid Cap firms, and even further for Small Cap and Fledgling firms.



	Day 5	Day 10	Day 15	Day 20
Top 40	0.19%	0.76%	1.20%	1.01%
Mid Cap	0.79%	0.81%	1.21%	1.39%
Small Cap	2.90%	3.59%	4.53%	4.78%
Fledgling	0.65%	1.87%	0.36%	1.76%

Figure 13: Combined CAARs for Size Classification (Outsiders)

The overall CAAR graph above attempts to combine the effect of the purchase and sale transactions for each separate size classification category. The sale transaction CAARs were multiplied by -1 and added to that of the purchase transaction CAARs. The CAARs earned by Small Cap transactions post the event date is the highest, with positive high CAARs in each of the 5 day periods post event date. The results indicate that directors in Small Cap firms are able to earn large abnormal returns by purchasing and selling shares in their own firms to a much larger extent than Mid Cap and Top 40 directors.

Table 10: Significance of Outsider Investors CAARs

	Purchases				Sales			
	T stat	P Value	5% Significance Level	10% Significance Level	T stat	P Value	5% Significance Level	10% Significance Level
Top 40								
0-5	0,79	0,47	Not Significant	Not Significant	-0,60	0,57	Not Significant	Not Significant
6-10	0,51	0,64	Not Significant	Not Significant	1,83	0,14	Not Significant	Not Significant
11-15	0,96	0,39	Not Significant	Not Significant	3,89	0,02	**Significant**	**Significant**
16-20	0,45	0,68	Not Significant	Not Significant	3,78	0,02	**Significant**	**Significant**
Mid Cap								
0-5	2,17	0,08	Not Significant	**Significant**	1,06	0,34	Not Significant	Not Significant
6-10	1,84	0,14	Not Significant	Not Significant	1,00	0,37	Not Significant	Not Significant
11-15	4,88	0,01	**Significant**	**Significant**	1,61	0,18	Not Significant	Not Significant
16-20	4,23	0,01	**Significant**	**Significant**	4,39	0,01	**Significant**	**Significant**
Small Cap								
0-5	3,50	0,02	**Significant**	**Significant**	3,15	0,03	**Significant**	**Significant**
6-10	4,11	0,01	**Significant**	**Significant**	4,40	0,01	**Significant**	**Significant**
11-15	7,11	0,00	**Significant**	**Significant**	2,46	0,07	Not Significant	**Significant**
16-20	10,18	0,00	**Significant**	**Significant**	4,65	0,01	**Significant**	**Significant**
Fledgling								
0-5	0,52	0,63	Not Significant	Not Significant	0,16	0,88	Not Significant	Not Significant
6-10	0,20	0,85	Not Significant	Not Significant	1,04	0,36	Not Significant	Not Significant
11-15	-0,77	0,49	Not Significant	Not Significant	0,73	0,50	Not Significant	Not Significant
16-20	-1,80	0,15	Not Significant	Not Significant	3,41	0,03	**Significant**	**Significant**

	Combined			
	T stat	P Value	5% Significance Level	10% Significance Level
Top 40				
0-5	0,30	0,77	Not Significant	Not Significant
6-10	1,96	0,12	Not Significant	Not Significant
11-15	2,00	0,12	Not Significant	Not Significant
16-20	4,28	0,01	**Significant**	**Significant**
Mid Cap				
0-5	2,40	0,06	Not Significant	**Significant**
6-10	3,47	0,03	**Significant**	**Significant**
11-15	2,91	0,04	**Significant**	**Significant**
16-20	5,75	0,00	**Significant**	**Significant**
Small Cap				
0-5	4,12	0,01	**Significant**	**Significant**
6-10	5,09	0,01	**Significant**	**Significant**
11-15	6,66	0,00	**Significant**	**Significant**
16-20	10,13	0,00	**Significant**	**Significant**
Fledgling				
0-5	0,33	0,76	Not Significant	Not Significant
6-10	0,99	0,38	Not Significant	Not Significant
11-15	0,20	0,85	Not Significant	Not Significant
16-20	1,21	0,29	Not Significant	Not Significant

Table 10 shows the results of the significance testing done at both a 5% and 10% significance levels on purchases, sales and the combined purchases and sales for outsiders mimicking directors' trades in the 20 days following the event date. Where a p-value is in red, underlined and in bold it signifies the abnormal returns are statistically significant during the period at that significance level. The abnormal returns available to outsiders mimicking insider trades in small cap companies, for both purchases and sales and these two combined, are significant across all 4 periods.

The abnormal returns outsiders can earn mimicking insider trades in Top 40 companies are mostly not significant except for sale transactions in the 11 to 15 and 16 to 20 day periods, and the combined transactions in the 16 to 20 day period at both significance levels. For Mid Cap companies insiders' abnormal returns available are significant across all three categories in the 16 to 20 day period (the only period where the sales are significant at either level) and significant at both 5% and 10% significance levels for all periods for combined transactions except day 0 to 5 for the 5% significance level.

5.2.2 Using the applicable size indices as market proxies

As mentioned in Chapter 4, as a robustness check for this part of the investigation (the link between CAARs and company sizes), the basic methodology was also repeated using the various applicable indices instead of the ALSI (J203) as market proxy when determining share betas. However, the results obtained by using the J203 as the market proxy were found to be almost identical to those obtained when using the J200 (Top 40), J201 (Mid Cap), J202 (Small Cap) ,and J204 (Fledgling) indices as the respective market proxies. Therefore, the trend lines were almost identical throughout, with the only variation being in the magnitude of the abnormal returns which, if anything, were slightly higher when using the firm size category index as the market proxy For example, outsiders mimicking director sales in the Small Cap companies group earned an abnormal return of 1.53% using the J203 as a market proxy, but 1.84% if the J202 was used as market proxy.

The graphs for the abnormal returns based on using the applicable size index as a market proxy, can be found in Appendix 6.

5.3 The link between industry classification and director CAARs

The following section will discuss the results of the analysis into whether a firm's industry classification affects the abnormal returns earned by insiders, and whether outsiders can mimic directors' trades to earn abnormal profits.

Unlike the size classification section that has gone before, firm returns were only compared to the ALSI to calculate the CAARs.

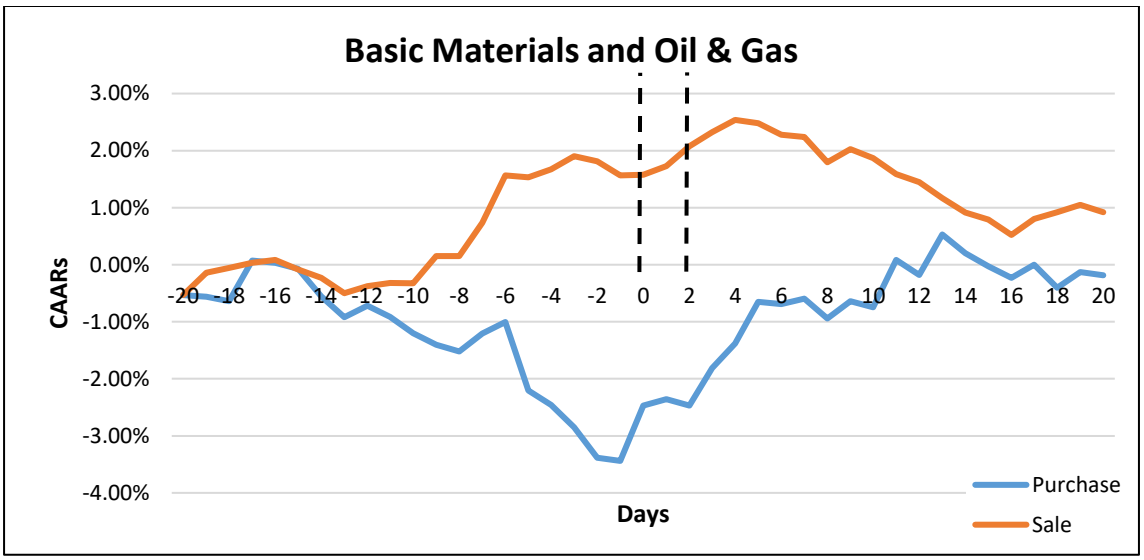


Figure 14: Sales & Purchases CAAR's for Basic Materials and Oil & Gas

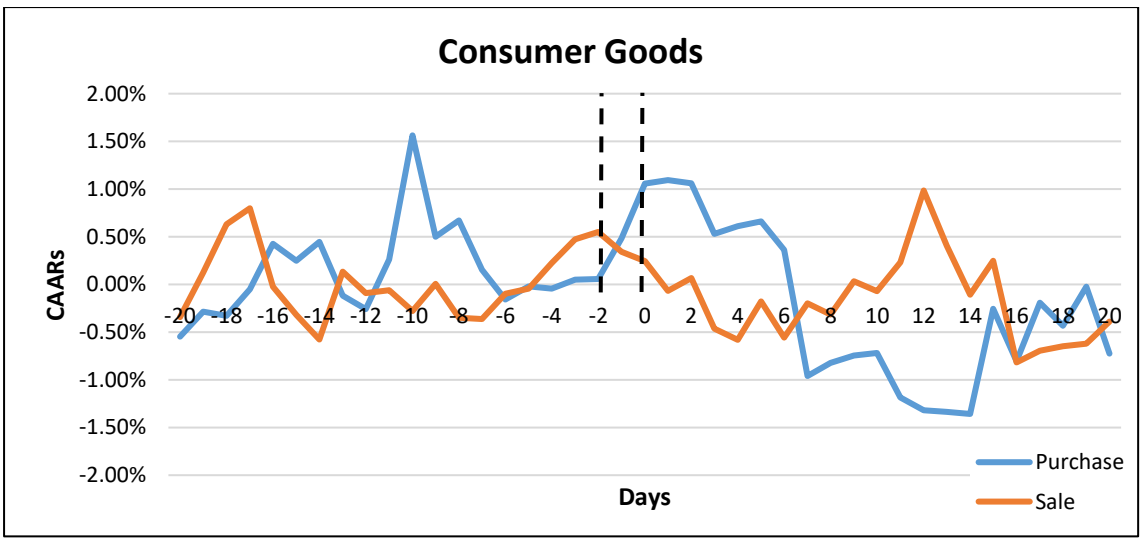


Figure 15: Sales & Purchases CAAR's for Consumer Goods

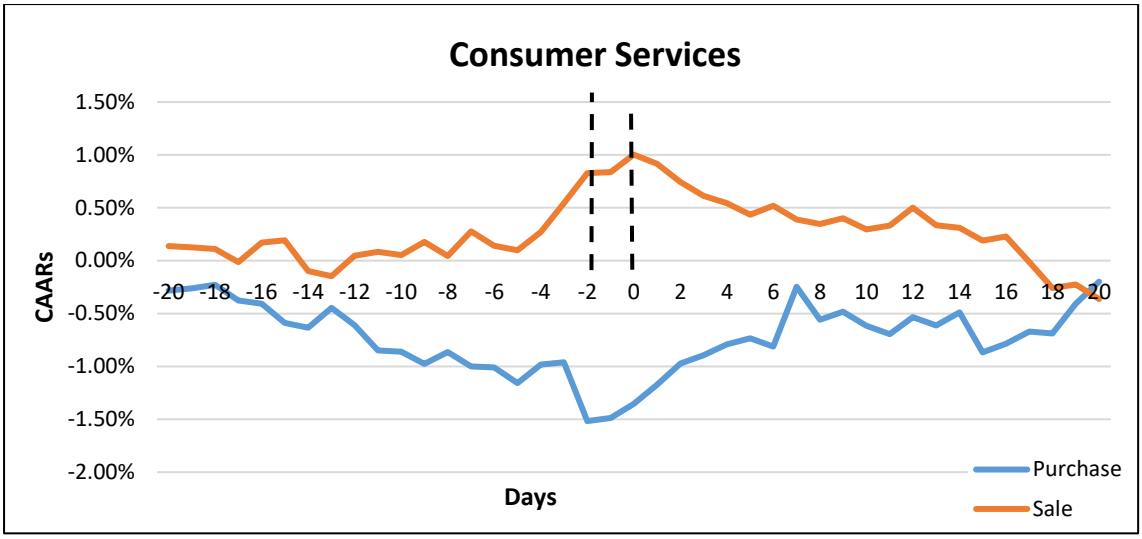


Figure 16: Sales & Purchases CAAR's for Consumer Services

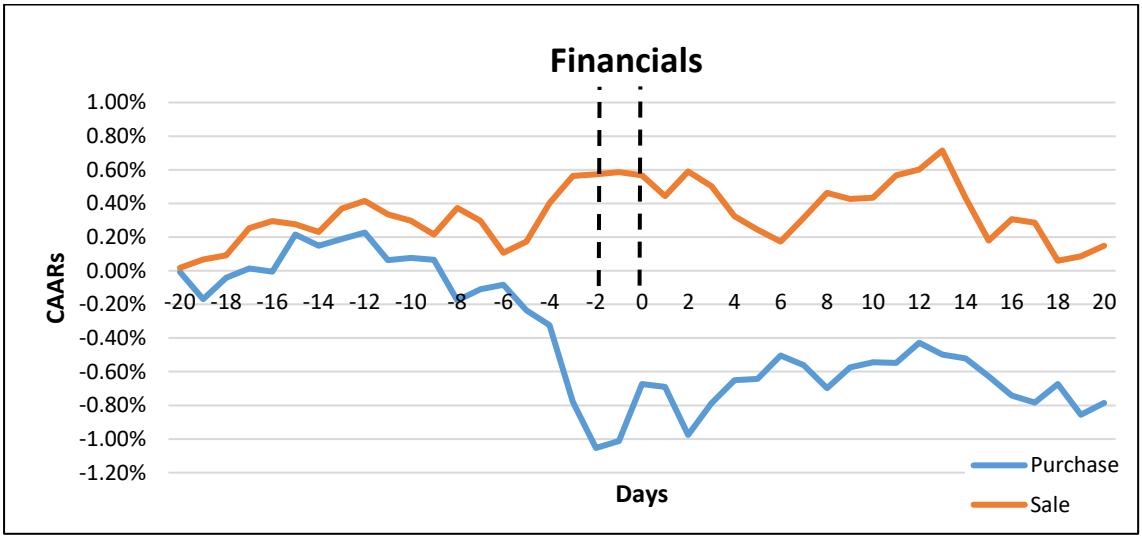


Figure 17: Sales & Purchases CAAR's for Financials

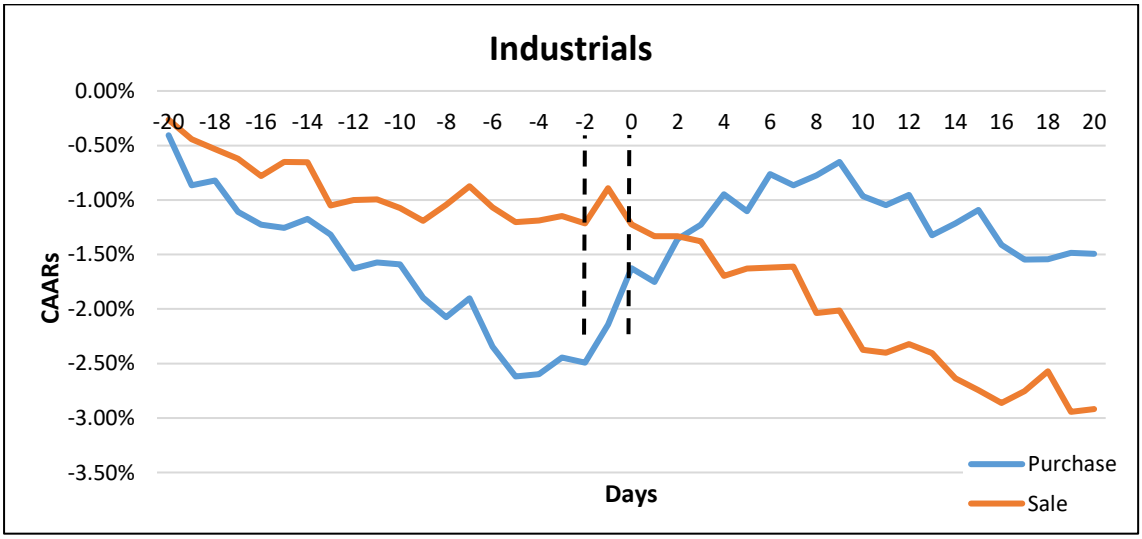


Figure 18: Sales & Purchases CAAR's for Industrials

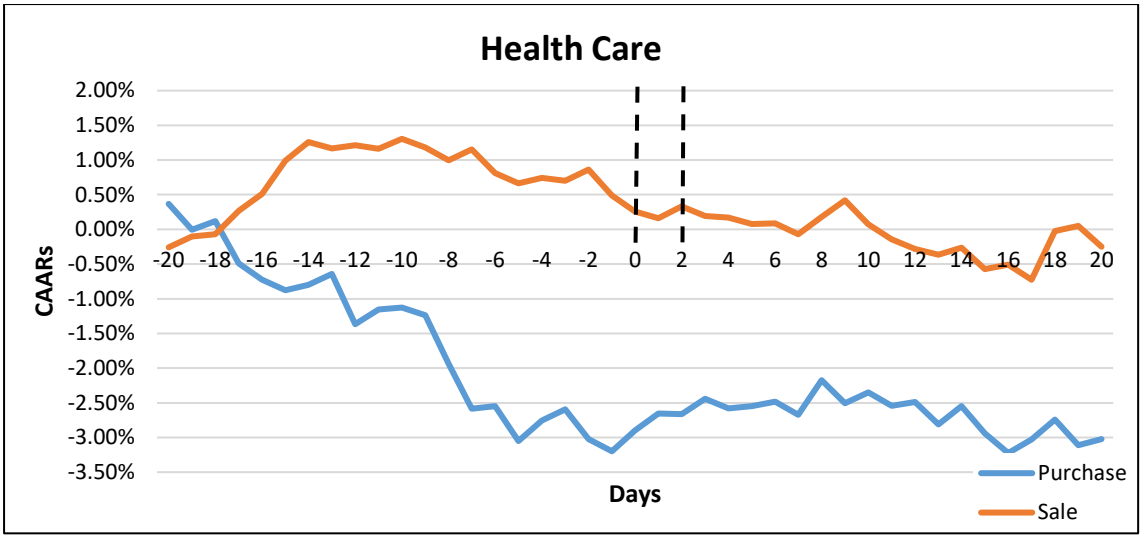


Figure 19: Sales & Purchases CAAR's for Health Care

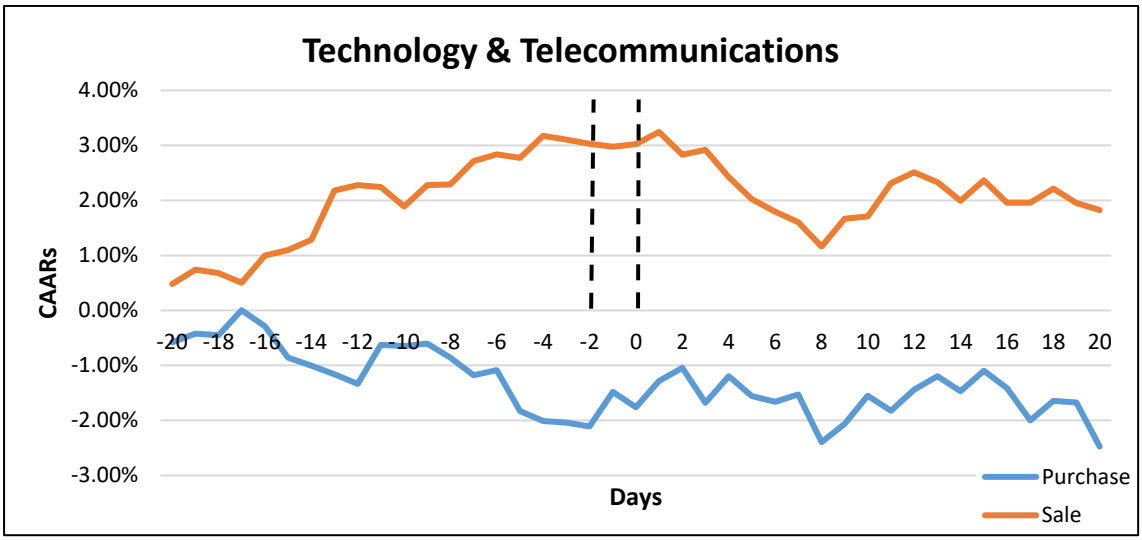


Figure 20: Sales & Purchases CAAR's for Technology & Telecommunications

a) Purchases

Table 11: Purchases annualised CAAR's for the 7 Industry Classifications

	Directors (Day -2 to +20)		Outsiders (Day 0 to +20)	
	Purchases	**Rank**	**Purchases**	**Rank**
Total	10,31%		14,54%	
Industry				
Basic Materials & Oil and Gas	51,90%	1	74,53%	1
Consumer Goods	-11,60%	7	-19,02%	7
Consumer Services	12,78%	3	24,90%	2
Financials	-0,10%	4	4,01%	4
Industrials	16,21%	2	11,89%	3
Health Care	-6,61%	5	3,10%	5
Technology & Telecommunications	-6,68%	6	-15,96%	6

The purchase transactions' CAARs for the Basic Materials and Oil & Gas, Consumer Services, Industrials and to a lesser extent Financials classifications follow a similar trend to the total purchase transactions CAARs for the entire sample as depicted in Figure 5. Thus, the CAARs follow a decreasing trend from the start of the event window, day -20, before reversing shortly after the director's purchase on day -2. For Basic Materials and Oil & Gas, Consumer Services, Financials, Industrials and Technology & Telecommunications, negative AARs are again observed up to and including day -2, becoming positive from day -1 onwards. The implications previously discussed for the entire sample therefore applies at the individual industry levels as well.

Basic Materials and Oil & Gas provide the largest post-trade CAAR, which peaks at 3.38% (89.85 annualised) CAAR at day 14 for directors who were able to time their purchase correctly by purchasing at day -1 (a 15 day window). The CAARs are slightly less if day -2 is used as the director's transaction date as assumed before. For this industrial group, outsiders have the opportunity to earn 3.26% by day 20 by purchasing shares in the industry at day 0 (an annualised return of 74.53%). It is not clear why this group of companies would deliver the best insider returns, but it could be that the market attaches particular value to insider signals sent within this industry. This is an untested view.

The purchase transactions CAARs associated with directors trading in the Consumer Goods group (Figure 15), do not follow a definite trend line, but fluctuates throughout the event window period. However, upon closer inspection there are three trades which

appear to be outliers in this sub sample and skews the outcome. The CAAR spike at day -10 is caused by a trade in AFGRI (AFI) with an associated AAR of 22.53% on day -10, the large dip on day 7 is caused by a trade in Steinhoff International (SHF) with an AAR of -10.44%, and the sudden uptrend at day 15 is caused by another trade in AFGRI (AFI) resulting in an AAR of 15.72%. The removal of the above three transactions see directors lose value on their purchase trade, particularly in the 3 days following the trade.

Outsiders are able to potentially earn significant annualised abnormal returns mimicking directors in the Basic Materials & Oil and Gas (74.53%), Consumer Services (24.90%) and Industrials (11.89%) industry classifications. However, mimicking director purchases in the Technology & Telecommunications (-15.96%) and Consumer Goods (-19.02%, or -6.08% after removal of the 3 outliers disclosed above) groups, result in negative annualised abnormal returns. There are also abnormal returns available for outsiders mimicking Financial and Health Care firms' director purchases, but their magnitude is dependent on when the outsider exits the position. For example, for Financial companies the annualised return is 4.01% if the position is held until day 20, but 17.78% if the position is exited at day 13, and for Health care it is 3.10% if the position is held until day 20, but higher (*e.g.* 51.20% at day 9) if exited earlier. When mimicking directors' trades in the Technology & Telecommunication industry, outsiders are limited to annualised positive abnormal returns only in the immediate short term by purchasing on day 0 and selling on days 2 and 3 and then again between days 12 and 16. In summary, from the above findings, outsiders would do best by mimicking directors' purchases in the short term for Basic Materials and Oil & Gas, Consumer Services and Industrials.

b) Sales

Table 12: Sales annualised CAAR's for the 7 Industry Classifications

	Directors (Day -2 to +20)		Outsiders (Day 0 to +20)	
	Sales	**Rank**	**Sales**	**Rank**
Total	17,32%		20,20%	
Industry				
Basic Materials & Oil and Gas	16,72%	3	11,80%	1
Consumer Goods	14,58%	6	13,52%	7
Consumer Services	15,37%	5	23,02%	3
Financials	6,79%	7	7,87%	6
Industrials	32,10%	1	41,67%	2
Health Care	16,18%	4	13,60%	5
Technology & Telecommunications	22,45%	2	22,05%	4

All the sales sub-samples, as that split by industry, indicate the South African market is not strong form efficient, with directors able to earn abnormal returns. Furthermore, except for the financials industry, these abnormal returns are all in double figures. The sale transactions' CAARs for the Basic Materials and Oil & Gas, Consumer Services and to a lesser extent the other classifications except for Consumer Goods, follow a similar trend line to the total sale transactions CAARs (see Figure 6) before the event date. The CAARs follow an increasing trend from the start of the event window, day -20, before reversing shortly after the director's sale. As with purchases, Basic Materials and Oil & Gas CAARs remain relatively consistent between days -20 to -6 before a large increase in CAARs between days -5 and -2, leading up to the assumed director's trade on day -2. The turnaround point in the CAAR graph is again before the SENS announcement date (with large positive AARs leading up to and including day -3 for Basic Materials and Oil & Gas and Financials and day -2 for Consumer Services).

The reversal in the AARs are not as consistent across the industries for sales as was the case for purchases. Directors selling their shares in Basic Materials & Oil and Gas experience an immediate reversal in AARs on day -2 (the CAARs are 1.90% at the director's assumed sale date), however this then reverts back to positive AARs until day 5 (CAARs are 2.54% at the close of day 5). Therefore, by delaying their sale until day 5, outsiders would make a higher abnormal profit than insiders do when trading on day -2 (0.97% additional CAAR). AARs remain positive for the Consumer Services industry until day 0,

before becoming negative post the event date, resulting in a gradual increase in CAARs earned by directors, and by outsiders if trading at day 0[30].

The CAARs related to the Industrial industry are unique in that directors would have experienced a decline in CAARs between day -20 and day -2 of -1.15%. However, if directors did not sell at day -2, but instead held the share until day 20, they would have lost an additional 1.77%. Likewise, outsiders would benefit from mimicking directors sell trades immediately, as holding onto the share until day 20 would result in them losing an additional 2.02% (an annualised figure of 41.67%, which is high). However, directors in this case do not time the market perfectly, as selling on day -2 as opposed to the day before the event window began (day -21) cost directors -1.15%. The same applies to the Health care industry, where selling on day -2 as opposed to day 20 results in a CAAR of 0.95% for directors, but the CAARs lost by selling on day -2 as opposed to day -9 is 0.60%. Outsiders, by mimicking director's sale transactions in the Health Care industry, would avoid a decline in CAARs of -0.74%, but could have earned superior returns by selling on day -11.

On the other hand, the CAARs associated with Consumer Goods director sale transactions once again did not follow a particular trend during the event window, and hence seem to have little informational value. This could have been due to the small sample comprising of only 26 sale transactions.

c) Combined purchase and sale CAARs

Table 13: Combined CAAR's for the 7 Industry Classifications at 5 day intervals

	Combined						
	Basic materials and Oil & Gas	**Consumer Goods**	**Consumer Services**	**Financials**	**Industrials**	**Health Care**	**Technology & Telecomm**
Day 5	1,87%	0,70%	1,15%	0,71%	1,78%	1,06%	0,87%
Day 10	2,39%	-0,79%	1,41%	0,62%	2,66%	1,26%	1,19%
Day 15	4,19%	-0,64%	1,27%	0,79%	2,90%	1,32%	0,99%
Day 20	3,90%	-0,47%	2,49%	0,66%	2,67%	0,91%	0,16%

[30] It is important to remember that a negative AAR is beneficial for a director post day -2 (and outsider post day 0) as it implies by selling their share they have avoided the negative AAR.

Table 13 presents the combined abnormal returns earned by mimicking director's trades on day 0 for both sales and purchase transactions (sales CAARs have been multiplied by -1). Mimicking directors' sales and purchases in Basic Materials and Oil & Gas provide the largest opportunity to earn abnormal returns across each of the four interval points, namely day 5, 10, 15 and 20. Significant abnormal returns are also available within the Consumer Services group, particularly between days 0 and 5, as well as 15 and 20. Industrials is another sector that provides large abnormal return opportunities for outsiders.

Consumer Goods is the only industry where outsiders would not earn CAARs by mimicking directors' trades and reversing their position at any time during the event window, with a positive CAAR only available if the outsider exited their position at the 5 day interval.

Table 14 Combined annualised CAAR's for 7 Industry Classifications

	Directors (Day -2 to +20)		Outsiders (Day 0 to +20)	
	Combined	**Rank**	**Combined**	**Rank**
Industry				
Basic Materials & Oil and Gas	76,60%	1	94,45%	1
Consumer Goods	1,40%	7	-7,93%	7
Consumer Services	29,98%	3	53,25%	3
Financials	6,69%	6	12,18%	5
Industrials	53,12%	2	58,16%	2
Health Care	8,57%	5	17,10%	4
Technology & Telecommunications	14,37%	4	2,77%	6

The presence of abnormal returns for outsiders in six of the seven industry classifications (excluding Consumer Goods as per Table 14), is consistent with the results found by Ek and Erlinder (2015), who for Sweden found that the Oil & Gas group provided the largest CAARs. A direct comparison to the current study is difficult, as here the Oil & Gas and Basic Materials industries were combined due to the small nature of the Oil & Gas transaction sample. However, Basic Materials and Oil & gas did provide the largest CAAR in this study, namely a substantial 94.45% combined annualised CAAR figure across sales and purchases.

Table 15- Statistical significance of outsider investors' CAARs

	Purchases				Sales			
	T stat	P Value	5% Significance Level	10% Significance Level	T stat	P Value	5% Significance Level	10% Significance Level
Basic Materials and Oil & Gas								
0-5	2,81	0,04	**Significant**	**Significant**	-2,43	0,06	Not Significant	**Significant**
6-10	4,94	0,01	**Significant**	**Significant**	-0,56	0,61	Not Significant	Not Significant
11-15	2,65	0,06	Not Significant	**Significant**	4,47	0,01	**Significant**	**Significant**
16-20	5,05	0,01	**Significant**	**Significant**	1,32	0,26	Not Significant	Not Significant
Consumer Goods								
0-5	0,21	0,84	Not Significant	Not Significant	0,65	0,54	Not Significant	Not Significant
6-10	-0,88	0,43	Not Significant	Not Significant	0,58	0,59	Not Significant	Not Significant
11-15	-0,55	0,61	Not Significant	Not Significant	0,07	0,95	Not Significant	Not Significant
16-20	-0,93	0,41	Not Significant	Not Significant	0,62	0,57	Not Significant	Not Significant
Consumer Services								
0-5	5,39	0,00	**Significant**	**Significant**	1,37	0,23	Not Significant	Not Significant
6-10	1,17	0,31	Not Significant	Not Significant	2,53	0,06	Not Significant	**Significant**
11-15	1,28	0,27	Not Significant	Not Significant	2,17	0,10	Not Significant	**Significant**
16-20	5,01	0,01	**Significant**	**Significant**	3,78	0,02	**Significant**	**Significant**
Financials								
0-5	0,71	0,51	Not Significant	Not Significant	1,24	0,27	Not Significant	Not Significant
6-10	1,76	0,15	Not Significant	Not Significant	0,66	0,54	Not Significant	Not Significant
11-15	1,98	0,12	Not Significant	Not Significant	0,90	0,42	Not Significant	Not Significant
16-20	0,83	0,45	Not Significant	Not Significant	1,45	0,22	Not Significant	Not Significant
Industrials								
0-5	1,54	0,18	Not Significant	Not Significant	1,81	0,13	Not Significant	Not Significant
6-10	2,13	0,10	Not Significant	**Significant**	2,95	0,04	**Significant**	**Significant**
11-15	2,23	0,09	Not Significant	**Significant**	7,27	0,00	**Significant**	**Significant**
16-20	1,92	0,13	Not Significant	Not Significant	4,13	0,01	**Significant**	**Significant**
Health Care								
0-5	1,55	0,18	Not Significant	Not Significant	1,24	0,27	Not Significant	Not Significant
6-10	1,18	0,30	Not Significant	Not Significant	0,72	0,51	Not Significant	Not Significant
11-15	0,42	0,69	Not Significant	Not Significant	3,09	0,04	**Significant**	**Significant**
16-20	0,27	0,80	Not Significant	Not Significant	0,84	0,45	Not Significant	Not Significant
Technology & Telecommunications								
0-5	-0,07	0,95	Not Significant	Not Significant	1,25	0,27	Not Significant	Not Significant
6-10	-0,06	0,96	Not Significant	Not Significant	1,56	0,19	Not Significant	Not Significant
11-15	0,51	0,64	Not Significant	Not Significant	0,70	0,52	Not Significant	Not Significant
16-20	-0,97	0,38	Not Significant	Not Significant	2,04	0,11	Not Significant	Not Significant

	Combined			
	T stat	P Value	5% Significance Level	10% Significance Level
Basic Materials and Oil & Gas				
0-5	1,45	0,21	Not Significant	Not Significant
6-10	23,39	0,00	**Significant**	**Significant**
11-15	2,96	0,04	**Significant**	**Significant**
16-20	6,51	0,00	**Significant**	**Significant**
Consumer Goods				
0-5	0,77	0,47	Not Significant	Not Significant
6-10	-0,44	0,68	Not Significant	Not Significant
11-15	-0,36	0,73	Not Significant	Not Significant
16-20	-0,34	0,75	Not Significant	Not Significant
Consumer Services				
0-5	3,48	0,02	**Significant**	**Significant**
6-10	1,67	0,17	Not Significant	Not Significant
11-15	3,47	0,03	**Significant**	**Significant**
16-20	8,88	0,00	**Significant**	**Significant**
Financials				
0-5	1,00	0,36	Not Significant	Not Significant
6-10	1,27	0,27	Not Significant	Not Significant
11-15	1,87	0,14	Not Significant	Not Significant
16-20	1,29	0,27	Not Significant	Not Significant
Industrials				
0-5	1,83	0,13	Not Significant	Not Significant
6-10	4,79	0,01	**Significant**	**Significant**
11-15	5,26	0,01	**Significant**	**Significant**
16-20	4,31	0,01	**Significant**	**Significant**
Health Care				
0-5	1,53	0,19	Not Significant	Not Significant
6-10	1,41	0,23	Not Significant	Not Significant
11-15	3,29	0,03	**Significant**	**Significant**
16-20	0,93	0,41	Not Significant	Not Significant
Technology & Telecommunications				
0-5	0,57	0,59	Not Significant	Not Significant
6-10	1,47	0,21	Not Significant	Not Significant
11-15	0,89	0,42	Not Significant	Not Significant
16-20	0,17	0,88	Not Significant	Not Significant

Table 15 shows the results of the significance testing done at both a 5% and 10% significance level on purchases, sales and combined purchases and sales for outsiders mimicking director's trades in the 20 days following the event date per industry classification. The abnormal returns available to outsiders mimicking insider trades in Consumer Goods, Financial, and Technology and Telecommunication companies, for both

purchases and sales as well as these two combined are not significant across all 4 periods at both the 5% and 10% significance levels.

Outsiders mimicking insiders transacting in Basic Materials and Oil & Gas are able to earn statistically significant abnormal returns when mimicking insider's purchase transactions in all but the 11 to 15 day period at the 5% significance level, whereas only day 11 to 15 provide significant abnormal returns for outsiders mimicking directors sales in the sector at a 5% significance level; outsiders mimicking both director purchases and sales combined are able to earn significant abnormal returns for all but the 0 to 5 day period. For the Consumer Services only outsider's mimicking of insider sales are not significant for the 0 to 5 day period at the 10% significance level, whilst outsider purchases, sales and both combined are significant for the 16 to 20 day period.

6. Conclusion and suggestions for future research

This study focussed on a number of new aspects of insider trading in the South African market, namely the relationship between size and/or industry classification of the firm and the abnormal returns earned by the directors trading in these companies. Furthermore, in contrast to most previous studies, this study did not only research the abnormal returns earned by directors, but also abnormal returns available to outsiders by mimicking the director's trades.

The results are consistent with international studies, indicating that directors are able to time the market, purchasing shares when their prices[31] are the lowest and selling shares when their prices are at the highest. In terms of market efficiency, these results support the hypothesis that directors have superior knowledge gained by their close relationship with their firm, and therefore trade on information that is not yet available to the public. This is evident by the reversal in CAARs two days prior to the director trade SENS announcement date, which is approximately the time of the actual directors' trades given the JSE listing requirement that a director's trade be publically announced within 48 hours.

Outsiders have the opportunity to earn abnormal returns by mimicking director trades at their earliest possible opportunity, which theoretically is the date the trade becomes public knowledge by means of a SENS announcement. In the case of purchase transactions directors generally correctly predict a rise in CAARs when timing their purchases, whilst for sale transactions directors generally correctly predict a fall in the share price and thus exit their position in a firm at the optimal time. Sale transactions provided higher abnormal returns to directors than purchase transactions. This is to an extent in line with the prior South African studies of Mordant and Muller (2003) and Ismail (2016), who both found that director sales resulted in positive returns, but that purchases did not (or, when they did, the result was not statistically significant).

The size of a firm plays a role in the level of abnormal returns earned by directors, as well as the abnormal returns earned by outsiders who mimic these trades. Directors of Small

[31] Prices and CAARs are used interchangeably as majority of the CAARs are made up of price changes.

Cap firms earn significantly larger abnormal returns, although Top 40 and Mid Cap directors also earn positive abnormal returns. However, the CAARs earned by Top 40 directors are relatively small, and could possibly even be reduced to zero by the transaction costs associated with these trades. Results for directors' sales transactions were similar, again indicating the ability of directors to earn abnormal returns in Small Cap, Mid Cap and Top 40 firms, and directors of Small Cap firms once again earning the highest abnormal returns.

Industry classification was also found to affect the abnormal returns available for directors, and hence also outsiders. Directors in Basic Materials and Oil & Gas earned the largest abnormal returns for purchases, with five of the other six industries investigated (the exception being Consumer Goods), also providing directors and outsiders an opportunity to earn abnormal returns. For all seven industries directors timed their sales to earn abnormal returns in the form of avoiding a fall in share prices. In this case, Technology & Telecommunications and Industrials provided the largest CAARs.

In terms of market characteristics, the findings of this study is inconsistent with both the strong and the semi-strong forms of market efficiency for the JSE. Specifically, the results indicate that outside investors can use the information signalled by a director's trade to formulate a profitable abnormal return-generating trading strategy. Furthermore, the information conveyed by small cap directors' trades seems to contain more inside information than Top 40 firm directors' trades, most likely because the information the Top 40 directors are acting on is generally to a far greater extent already in the public domain.

Lastly, this study can be extended by investigating how transaction costs impact the ability of outsiders to earn abnormal profits. In addition, a short time horizon of 20 days either side of the event window was used. A longer time horizon may shed light on the effect of directors' transactions, and the possibility for directors to earn abnormal profits into the long term. Finally the effect of momentum trading could be separated from the results in order to identify the true abnormal return earned by the director ex-momentum trading.

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8. Appendixes

Appendix 1 –Director Trades by company

Appendix 1 shows the 1,026 director dealings classified by company. The CAAR column gives the summed AAR of each director dealing over the event window and averaged across the company (sales CAARs have been multiplied by -1). The Size listed in Appendix 1 relates to the size of the company at the last director dealing in the sample (a * signifies a company moved between size classifications during the dates used in the analysis).

Share:	No. of Trades:	CAAR:	Size:	Industry
1TM	1	24,98%	Fledgling	Financials
ABL	14	-0,92%	Top 40*	Financials
ACP	6	1,08%	Mid Cap	Financials
ADR	2	4,56%	Small Cap	Financials
ADW	14	-9,62%	NA	Financials
AEG	2	-1,30%	Mid Cap	Industrials
AFE	5	-7,11%	Mid Cap	Basic Materials and Oil & Gas
AFR	8	-1,00%	Small Cap	Consumer Goods
AFX	2	4,71%	Mid Cap	Basic Materials and Oil & Gas
AGI	2	-0,51%	Fledgling	Industrials
AGL	1	0,28%	Top 40	Health Care
AIP	2	-4,25%	Mid Cap	Health Care
ALT	1	-12,99%	Mid Cap	Consumer Goods
AMA	1	2,28%	Fledgling	Basic Materials and Oil & Gas
AMS	10	2,55%	Top 40	Basic Materials and Oil & Gas
ANG	4	-5,00%	Top 40	Basic Materials and Oil & Gas
ANS	1	-23,58%	NA	Industrials
APK	6	7,87%	Small Cap	Industrials
APN	8	-2,50%	Top 40*	Health Care
ARI	1	-9,35%	Mid Cap	Industrials
ART	11	3,50%	Small Cap	Industrials
ASA	10	0,33%	Top 40	Financials
ASR	4	4,61%	Top 40	Basic Materials and Oil & Gas
ATN	15	-3,30%	Mid Cap	Industrials
ATR	1	3,30%	NA	Consumer Goods
AVI	3	16,37%	Mid Cap	Consumer Goods
BAT	2	21,74%	Small Cap	NA
BAW	14	-3,22%	Mid Cap*	Industrials
BCX	1	13,07%	Small Cap	Financials
BDM	1	-4,89%	Fledgling	Financials
BFS	3	-6,96%	NA	Financials

BLU	5	-11,47%	Small Cap*	Technology and Telecommunications
BSR	15	3,51%	Small Cap*	Industrials
BVT	16	-1,66%	Top 40	Industrials
BWI	1	19,69%	NA	Consumer Services
CAT	6	-1,49%	Mid Cap	Consumer Services
CLH	10	7,85%	Small Cap	Consumer Services
CLS	9	-3,54%	Mid Cap*	Consumer Services
CML	3	11,37%	Mid Cap*	Financials
CMO	1	-23,32%	NA	Health Care
CMP	7	-4,28%	Small Cap	Health Care
CPI	22	2,48%	Mid Cap*	Financials
CPL	8	0,51%	Mid Cap	Financials
CSB	2	6,98%	Small Cap	Industrials
DAW	2	-3,36%	Small Cap	Industrials
DGC	10	-3,51%	Small Cap*	Industrials
DRD	9	8,17%	Small Cap	Basic Materials and Oil & Gas
DST	1	-7,03%	Mid Cap	Financials
DSY	26	0,39%	Mid Cap*	Financials
DTC	22	0,66%	Mid Cap	Technology and Telecommunications
ELI	4	-4,68%	Fledgling	Industrials
EMI	3	-0,17%	Mid Cap	Financials
EOH	2	1,31%	Small Cap	Technology and Telecommunications
EQS	2	6,39%	Small Cap	Industrials
ESR	10	12,36%	Small Cap*	Industrials
EXX	2	-9,94%	Top 40	Basic Materials and Oil & Gas
FBR	21	0,05%	Small Cap	Consumer Services
FSR	11	-1,18%	Top 40	Financials
GFI	13	3,28%	Top 40	Basic Materials and Oil & Gas
GND	1	-2,62%	Mid Cap	Industrials
GRF	5	2,93%	Small Cap*	Industrials
GRT	23	-1,64%	Top 40*	Financials
HAR	4	-4,76%	Top 40	Basic Materials and Oil & Gas
HCI	5	1,71%	Mid Cap	NA
HDC	4	-1,84%	Small Cap	Industrials
HLM	6	-1,44%	Small Cap*	Basic Materials and Oil & Gas
HYP	6	-3,20%	Mid Cap	Financials
ILA	1	6,04%	Small Cap	Consumer Goods
ILV	7	-4,45%	Mid Cap	Consumer Goods
IMP	4	2,13%	Top 40	Basic Materials and Oil & Gas
INL	20	1,83%	Top 40	Financials
INP	1	4,49%	Top 40	Industrials
IPL	22	0,90%	Top 40*	Industrials
IVT	2	8,82%	Small Cap	Industrials
JDG	6	3,69%	Mid Cap	Consumer Services
JSE	8	-1,72%	Mid Cap*	Financials

KIO	4	1,09%	Top 40	Financials
LBH	4	-1,91%	Mid Cap	Financials
LEW	17	2,25%	Mid Cap	Health Care
LHC	2	-2,78%	Mid Cap	Health Care
MDC	20	-1,74%	Mid Cap	Health Care
MMH	5	0,83%	Fledgling	Basic Materials and Oil & Gas
MMI	2	2,75%	Mid Cap	Basic Materials and Oil & Gas
MML	2	-6,14%	Fledgling	Consumer Services
MND	3	-8,09%	Top 40	Basic Materials and Oil & Gas
MPC	12	-3,74%	Mid Cap	Consumer Services
MRF	1	-4,65%	Small Cap	Consumer Services
MSM	9	3,62%	Mid Cap	Consumer Services
MTA	2	0,76%	Small Cap	Consumer Goods
MTN	8	6,02%	Top 40	Technology and Telecommunications
MUR	4	0,57%	Mid Cap*	Industrials
NED	15	-0,86%	Top 40	Financials
NHM	2	-20,07%	Mid Cap	Basic Materials and Oil & Gas
NPK	8	-0,40%	Mid Cap	Industrials
NPN	13	0,77%	Top 40	Consumer Services
NTC	19	2,00%	Mid Cap*	Health Care
OMN	13	0,35%	Small Cap	Basic Materials and Oil & Gas
PET	4	-12,12%	Small Cap	Basic Materials and Oil & Gas
PFG	3	0,07%	Mid Cap*	Financials
PGR	10	5,39%	Small Cap*	Financials
PIK	9	0,22%	Mid Cap*	Consumer Services
PNC	18	-6,80%	Small Cap*	Technology and Telecommunications
PPC	2	3,00%	Mid Cap*	Industrials
PSG	2	3,85%	Small Cap*	Financials
PWK	16	2,08%	Mid Cap	Consumer Services
RBP	5	2,67%	Mid Cap	Basic Materials and Oil & Gas
RBX	1	20,52%	Mid Cap	Financials
RDF	16	-0,84%	Mid Cap	Financials
REM	9	-0,51%	Top 40	Industrials
RES	16	0,57%	Mid Cap	Financials
RLO	5	1,56%	Mid Cap*	Industrials
RMH	3	0,70%	Top 40	Financials
SAC	9	-2,29%	Mid Cap	Financials
SAN	3	1,73%	NA	Industrials
SAP	14	-0,34%	Mid Cap*	Basic Materials and Oil & Gas
SBK	11	-2,22%	Top 40	Financials
SHF	22	-1,46%	Top 40*	Consumer Goods
SHP	35	-1,27%	Top 40*	Consumer Services
SIM	3	5,04%	Mid Cap*	Basic Materials and Oil & Gas
SLM	3	-4,23%	Top 40	Financials
SNT	10	-2,19%	Mid Cap	Financials

SNU	5	5,54%	Small Cap*	Basic Materials and Oil & Gas
SOL	12	-2,33%	Top 40	Basic Materials and Oil & Gas
SPP	7	-3,48%	Mid Cap	Consumer Services
SSK	8	5,48%	Small Cap	Industrials
SUI	12	-2,86%	Mid Cap	Consumer Services
SYC	1	-0,24%	Small Cap	Consumer Goods
TBS	5	3,31%	Top 40	Consumer Goods
TFG	10	-4,27%	Mid Cap	Consumer Services
TKG	2	-8,90%	Top 40	Industrials
TRE	1	5,01%	Mid Cap	Consumer Services
TRU	7	2,65%	Top 40*	Consumer Services
VIL	1	-4,17%	Fledgling	Financials
VKE	6	-0,26%	Small Cap	Industrials
WBO	2	-4,12%	Mid Cap	Industrials
WEA	4	3,13%	NA	Industrials
WHL	24	-1,04%	Top 40*	Consumer Services
WSL	1	-5,28%	NA	Consumer Services

Appendix 2 – Overall CAAR during Event Window

	Combined		Purchases		Sales	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,06%	-0,06%	-0,25%	-0,25%	-0,09%	-0,09%
Day -19	-0,09%	-0,16%	-0,13%	-0,38%	0,06%	-0,03%
Day -18	0,04%	-0,12%	0,11%	-0,27%	0,02%	-0,01%
Day -17	0,01%	-0,11%	0,05%	-0,23%	0,02%	0,02%
Day -16	-0,04%	-0,15%	-0,04%	-0,27%	0,03%	0,05%
Day -15	-0,03%	-0,17%	-0,03%	-0,30%	0,03%	0,07%
Day -14	0,01%	-0,16%	-0,08%	-0,38%	-0,09%	-0,02%
Day -13	-0,01%	-0,17%	-0,06%	-0,44%	-0,02%	-0,04%
Day -12	-0,07%	-0,25%	-0,10%	-0,53%	0,09%	0,05%
Day -11	-0,01%	-0,26%	-0,03%	-0,56%	0,00%	0,04%
Day -10	0,04%	-0,22%	0,03%	-0,53%	-0,05%	-0,01%
Day -9	-0,12%	-0,34%	-0,18%	-0,71%	0,08%	0,07%
Day -8	-0,07%	-0,41%	-0,15%	-0,86%	0,00%	0,07%
Day -7	-0,11%	-0,52%	0,00%	-0,86%	0,19%	0,27%
Day -6	-0,01%	-0,52%	-0,06%	-0,92%	-0,01%	0,26%
Day -5	-0,14%	-0,66%	-0,34%	-1,26%	-0,03%	0,23%
Day -4	-0,10%	-0,76%	-0,03%	-1,29%	0,15%	0,38%
Day -3	-0,16%	-0,92%	-0,17%	-1,46%	0,15%	0,53%
Day -2	-0,16%	-1,08%	-0,29%	-1,75%	0,06%	0,59%
Day -1	0,06%	-1,02%	0,13%	-1,62%	0,00%	0,58%
Day -0	0,20%	-0,82%	0,39%	-1,23%	-0,04%	0,54%
Day 1	0,07%	-0,75%	0,07%	-1,16%	-0,06%	0,48%
Day 2	-0,02%	-0,77%	0,01%	-1,16%	0,04%	0,52%
Day 3	0,09%	-0,68%	0,13%	-1,02%	-0,06%	0,46%
Day 4	0,16%	-0,51%	0,20%	-0,82%	-0,13%	0,33%
Day 5	0,06%	-0,45%	0,08%	-0,74%	-0,05%	0,28%
Day 6	0,06%	-0,40%	0,06%	-0,68%	-0,06%	0,23%
Day 7	0,00%	-0,39%	0,00%	-0,69%	-0,01%	0,22%
Day 8	0,00%	-0,39%	-0,16%	-0,85%	-0,14%	0,08%
Day 9	0,00%	-0,39%	0,13%	-0,72%	0,10%	0,18%
Day 10	0,06%	-0,33%	-0,04%	-0,76%	-0,15%	0,04%
Day 11	0,00%	-0,32%	0,03%	-0,73%	0,02%	0,05%
Day 12	-0,02%	-0,34%	0,07%	-0,66%	0,09%	0,14%
Day 13	0,06%	-0,28%	-0,01%	-0,67%	-0,11%	0,03%
Day 14	0,10%	-0,18%	-0,01%	-0,68%	-0,19%	-0,16%
Day 15	0,04%	-0,14%	-0,05%	-0,73%	-0,11%	-0,27%
Day 16	-0,03%	-0,17%	-0,17%	-0,89%	-0,09%	-0,36%
Day 17	0,01%	-0,16%	0,03%	-0,87%	-0,02%	-0,38%
Day 18	0,01%	-0,16%	0,01%	-0,86%	0,00%	-0,38%
Day 19	0,05%	-0,11%	0,05%	-0,81%	-0,05%	-0,43%
Day 20	0,01%	-0,10%	-0,03%	-0,84%	-0,05%	-0,48%

Appendix 3a –Combined CAARs during Event Window by Company Size

Combined	Top 40		Mid Cap		Small Cap		Fledgling	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	0,05%	0,05%	-0,30%	-0,30%	-0,23%	-0,30%	0,62%	0,62%
Day -19	0,01%	0,07%	0,01%	-0,29%	-0,32%	-0,54%	-0,77%	-0,15%
Day -18	-0,23%	-0,17%	0,23%	-0,06%	0,02%	-0,06%	0,59%	0,44%
Day -17	0,30%	0,13%	-0,14%	-0,21%	-0,01%	-0,53%	0,42%	0,85%
Day -16	-0,17%	-0,04%	-0,13%	-0,34%	0,19%	-0,34%	0,35%	1,20%
Day -15	0,04%	0,00%	-0,01%	-0,35%	0,01%	-0,33%	-1,50%	-0,30%
Day -14	0,30%	0,30%	-0,20%	-0,55%	-0,10%	-0,55%	-0,45%	-0,75%
Day -13	-0,09%	0,22%	0,03%	-0,52%	-0,21%	-0,63%	-0,67%	-1,42%
Day -12	-0,34%	-0,13%	-0,09%	-0,61%	-0,15%	-0,61%	-0,32%	-1,74%
Day -11	-0,09%	-0,22%	-0,05%	-0,66%	-0,06%	-0,84%	0,71%	-1,03%
Day -10	-0,22%	-0,44%	-0,14%	-0,80%	0,75%	-0,80%	2,12%	1,09%
Day -9	-0,30%	-0,74%	-0,17%	-0,97%	-0,14%	-0,24%	-1,31%	-0,22%
Day -8	0,00%	-0,74%	-0,04%	-1,02%	-0,14%	-1,02%	-0,86%	-1,07%
Day -7	-0,17%	-0,91%	-0,26%	-1,28%	-0,11%	-0,48%	0,27%	-0,81%
Day -6	-0,40%	-1,31%	-0,07%	-1,36%	0,24%	-1,36%	0,81%	0,01%
Day -5	-0,12%	-1,44%	-0,32%	-1,68%	-0,35%	-0,59%	-0,38%	-0,37%
Day -4	-0,09%	-1,52%	0,05%	-1,63%	-0,32%	-1,63%	-0,95%	-1,33%
Day -3	-0,37%	-1,89%	-0,30%	-1,93%	-0,19%	-1,11%	-0,47%	-1,80%
Day -2	-0,09%	-1,98%	-0,54%	-2,47%	-0,35%	-2,47%	0,68%	-1,12%
Day -1	0,02%	-1,96%	0,19%	-2,27%	0,43%	-1,03%	-0,51%	-1,63%
Day -0	0,01%	-1,95%	0,27%	-2,00%	0,91%	-2,00%	0,65%	-0,98%
Day 1	0,37%	-1,58%	0,07%	-1,93%	0,21%	0,08%	0,21%	-0,77%
Day 2	-0,16%	-1,75%	-0,08%	-2,01%	0,24%	-2,01%	0,56%	-0,21%
Day 3	0,05%	-1,70%	0,27%	-1,74%	0,58%	0,90%	-1,47%	-1,69%
Day 4	0,26%	-1,43%	0,16%	-1,59%	0,28%	-1,59%	0,60%	-1,09%
Day 5	-0,34%	-1,77%	0,11%	-1,48%	0,69%	1,87%	0,11%	-0,98%
Day 6	-0,10%	-1,87%	0,09%	-1,39%	0,43%	-1,39%	-0,54%	-1,52%
Day 7	0,34%	-1,53%	-0,03%	-1,42%	-0,23%	2,07%	1,08%	-0,45%
Day 8	-0,01%	-1,54%	-0,16%	-1,58%	0,40%	-1,58%	-0,67%	-1,11%
Day 9	0,16%	-1,38%	0,09%	-1,48%	-0,16%	2,30%	0,27%	-0,84%
Day 10	0,18%	-1,20%	0,01%	-1,47%	0,26%	-1,47%	1,09%	0,25%
Day 11	0,32%	-0,88%	-0,10%	-1,57%	-0,25%	2,31%	-0,34%	-0,10%
Day 12	0,20%	-0,68%	-0,10%	-1,67%	0,11%	-1,67%	-1,13%	-1,23%
Day 13	-0,31%	-0,98%	0,33%	-1,34%	0,20%	2,62%	-0,32%	-1,55%
Day 14	0,29%	-0,69%	0,11%	-1,23%	0,60%	-1,23%	-0,72%	-2,27%
Day 15	-0,07%	-0,76%	0,17%	-1,06%	0,28%	3,50%	1,00%	-1,27%
Day 16	-0,18%	-0,95%	-0,05%	-1,11%	0,20%	-1,11%	-0,49%	-1,76%
Day 17	0,09%	-0,86%	-0,01%	-1,11%	0,27%	3,96%	-0,12%	-1,88%
Day 18	0,01%	-0,85%	-0,07%	-1,18%	0,02%	-1,18%	0,52%	-1,36%
Day 19	-0,10%	-0,95%	0,17%	-1,01%	0,05%	4,03%	1,22%	-0,13%
Day 20	0,00%	-0,95%	0,13%	-0,88%	-0,28%	-0,88%	0,27%	0,13%

Appendix 3b –Purchase CAARs during Event Window by Company Size

Purchases	Top 40		Mid Cap		Small Cap		Fledgling	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,16%	-0,16%	-0,31%	-0,31%	-0,36%	-0,36%	0,44%	0,44%
Day -19	0,20%	0,05%	0,01%	-0,29%	-0,17%	-0,53%	-1,10%	-0,66%
Day -18	-0,03%	0,02%	0,26%	-0,12%	-0,02%	-0,55%	-0,46%	-1,12%
Day -17	0,27%	0,29%	-0,14%	-0,21%	0,26%	-0,29%	0,52%	-0,60%
Day -16	0,01%	0,30%	-0,12%	-0,40%	0,18%	-0,11%	-0,35%	-0,94%
Day -15	0,08%	0,38%	-0,01%	-0,35%	0,10%	0,00%	-1,39%	-2,33%
Day -14	0,03%	0,41%	-0,08%	-0,49%	-0,29%	-0,30%	-0,79%	-3,12%
Day -13	-0,06%	0,35%	0,03%	-0,52%	-0,48%	-0,78%	-0,19%	-3,31%
Day -12	-0,22%	0,13%	-0,09%	-0,51%	-0,13%	-0,91%	0,02%	-3,29%
Day -11	-0,13%	0,00%	-0,05%	-0,66%	0,13%	-0,78%	0,09%	-3,20%
Day -10	-0,16%	-0,17%	-0,19%	-0,71%	0,67%	-0,12%	1,17%	-2,03%
Day -9	-0,18%	-0,34%	-0,17%	-0,97%	-0,23%	-0,34%	-0,38%	-2,41%
Day -8	0,03%	-0,31%	0,01%	-0,81%	-0,29%	-0,63%	-1,06%	-3,47%
Day -7	0,04%	-0,27%	-0,26%	-1,28%	0,07%	-0,57%	0,65%	-2,82%
Day -6	-0,15%	-0,43%	0,03%	-0,83%	-0,41%	-0,97%	0,77%	-2,04%
Day -5	-0,23%	-0,65%	-0,32%	-1,68%	-0,40%	-1,38%	-0,67%	-2,71%
Day -4	0,12%	-0,54%	0,15%	-1,00%	-0,13%	-1,51%	-0,64%	-3,35%
Day -3	-0,30%	-0,84%	-0,30%	-1,93%	0,26%	-1,25%	-0,71%	-4,06%
Day -2	-0,21%	-1,06%	-0,25%	-1,42%	-0,37%	-1,62%	0,12%	-3,94%
Day -1	0,00%	-1,06%	0,19%	-2,27%	0,56%	-1,06%	-0,08%	-4,02%
Day -0	0,12%	-0,94%	0,28%	-1,03%	0,57%	-0,49%	0,54%	-3,48%
Day 1	0,28%	-0,67%	0,07%	-1,93%	-0,01%	-0,50%	0,10%	-3,38%
Day 2	-0,08%	-0,75%	0,02%	-0,95%	0,13%	-0,37%	-0,03%	-3,41%
Day 3	0,09%	-0,66%	0,27%	-1,74%	0,41%	0,04%	-0,47%	-3,88%
Day 4	0,16%	-0,51%	0,00%	-0,82%	0,33%	0,37%	0,35%	-3,53%
Day 5	-0,21%	-0,72%	0,11%	-1,48%	0,48%	0,85%	-0,04%	-3,58%
Day 6	-0,17%	-0,89%	0,06%	-0,71%	0,30%	1,15%	-0,07%	-3,65%
Day 7	0,19%	-0,70%	-0,03%	-1,42%	-0,25%	0,90%	0,37%	-3,28%
Day 8	-0,25%	-0,95%	-0,23%	-0,89%	0,36%	1,26%	-1,25%	-4,54%
Day 9	0,22%	-0,73%	0,09%	-1,48%	-0,05%	1,21%	0,69%	-3,85%
Day 10	-0,08%	-0,82%	0,02%	-0,67%	0,03%	1,24%	0,15%	-3,70%
Day 11	0,17%	-0,64%	-0,10%	-1,57%	-0,09%	1,15%	0,03%	-3,67%
Day 12	0,13%	-0,51%	0,01%	-0,73%	0,34%	1,49%	-0,60%	-4,27%
Day 13	-0,22%	-0,73%	0,33%	-1,34%	-0,02%	1,48%	0,01%	-4,26%
Day 14	0,15%	-0,58%	0,03%	-0,59%	0,09%	1,57%	-0,46%	-4,72%
Day 15	-0,10%	-0,68%	0,17%	-1,06%	0,26%	1,84%	0,13%	-4,58%
Day 16	-0,26%	-0,94%	-0,12%	-0,73%	0,01%	1,84%	-0,62%	-5,21%
Day 17	0,11%	-0,83%	-0,01%	-1,11%	0,20%	2,04%	-0,99%	-6,20%
Day 18	-0,07%	-0,90%	-0,02%	-0,77%	0,12%	2,15%	0,00%	-6,20%
Day 19	0,06%	-0,85%	0,17%	-1,01%	0,18%	2,34%	-0,02%	-6,21%
Day 20	-0,07%	-0,92%	0,05%	-0,71%	-0,15%	2,19%	0,19%	-6,02%

Appendix 3c –Sale CAARs during Event Window by Company Size

Sales	Top 40		Mid Cap		Small Cap		Fledgling	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,21%	-0,21%	-0,01%	-0,01%	-0,13%	-0,13%	-0,17%	-0,17%
Day -19	0,19%	-0,02%	-0,08%	-0,09%	0,15%	0,02%	-0,33%	-0,51%
Day -18	0,21%	0,18%	0,03%	-0,06%	-0,05%	-0,03%	-1,05%	-1,55%
Day -17	-0,03%	0,16%	-0,02%	-0,08%	0,27%	0,25%	0,10%	-1,45%
Day -16	0,18%	0,34%	0,02%	-0,06%	-0,01%	0,23%	-0,69%	-2,14%
Day -15	0,04%	0,37%	0,00%	-0,06%	0,09%	0,32%	0,11%	-2,03%
Day -14	-0,27%	0,10%	0,12%	0,06%	-0,20%	0,13%	-0,34%	-2,37%
Day -13	0,03%	0,13%	0,05%	0,11%	-0,27%	-0,15%	0,48%	-1,89%
Day -12	0,12%	0,25%	0,00%	0,10%	0,02%	-0,12%	0,34%	-1,55%
Day -11	-0,04%	0,21%	0,03%	0,13%	0,18%	0,06%	-0,62%	-2,17%
Day -10	0,06%	0,27%	-0,05%	0,09%	-0,08%	-0,02%	-0,95%	-3,11%
Day -9	0,13%	0,40%	0,06%	0,15%	-0,08%	-0,11%	0,92%	-2,19%
Day -8	0,03%	0,43%	0,05%	0,20%	-0,15%	-0,26%	-0,20%	-2,40%
Day -7	0,21%	0,64%	0,22%	0,43%	0,17%	-0,09%	0,38%	-2,01%
Day -6	0,25%	0,89%	0,10%	0,53%	-0,65%	-0,73%	-0,04%	-2,05%
Day -5	-0,11%	0,78%	0,00%	0,53%	-0,05%	-0,79%	-0,29%	-2,34%
Day -4	0,20%	0,98%	0,11%	0,63%	0,20%	-0,59%	0,32%	-2,02%
Day -3	0,07%	1,05%	0,12%	0,76%	0,45%	-0,14%	-0,24%	-2,26%
Day -2	-0,13%	0,92%	0,29%	1,04%	-0,01%	-0,16%	-0,56%	-2,82%
Day -1	-0,02%	0,90%	-0,08%	0,96%	0,13%	-0,03%	0,43%	-2,39%
Day -0	0,10%	1,01%	0,00%	0,96%	-0,34%	-0,36%	-0,11%	-2,51%
Day 1	-0,09%	0,92%	-0,01%	0,96%	-0,22%	-0,58%	-0,11%	-2,61%
Day 2	0,08%	0,99%	0,11%	1,06%	-0,11%	-0,69%	-0,58%	-3,20%
Day 3	0,04%	1,03%	-0,14%	0,92%	-0,17%	-0,86%	1,00%	-2,20%
Day 4	-0,11%	0,93%	-0,16%	0,77%	0,05%	-0,82%	-0,25%	-2,44%
Day 5	0,12%	1,05%	-0,06%	0,71%	-0,20%	-1,02%	-0,15%	-2,60%
Day 6	-0,07%	0,98%	-0,03%	0,68%	-0,14%	-1,15%	0,47%	-2,12%
Day 7	-0,15%	0,83%	0,08%	0,75%	-0,01%	-1,17%	-0,71%	-2,84%
Day 8	-0,24%	0,59%	-0,07%	0,69%	-0,04%	-1,20%	-0,59%	-3,42%
Day 9	0,05%	0,64%	0,11%	0,80%	0,12%	-1,09%	0,42%	-3,00%
Day 10	-0,26%	0,38%	0,00%	0,80%	-0,23%	-1,32%	-0,94%	-3,94%
Day 11	-0,14%	0,24%	0,04%	0,84%	0,16%	-1,16%	0,37%	-3,57%
Day 12	-0,07%	0,17%	0,11%	0,94%	0,23%	-0,93%	0,53%	-3,04%
Day 13	0,08%	0,25%	-0,22%	0,72%	-0,22%	-1,15%	0,33%	-2,71%
Day 14	-0,14%	0,11%	-0,08%	0,64%	-0,50%	-1,65%	0,26%	-2,45%
Day 15	-0,03%	0,08%	-0,19%	0,45%	-0,01%	-1,66%	-0,86%	-3,31%
Day 16	-0,08%	0,00%	-0,08%	0,37%	-0,19%	-1,85%	-0,14%	-3,45%
Day 17	0,02%	0,02%	-0,01%	0,37%	-0,07%	-1,92%	-0,87%	-4,32%
Day 18	-0,08%	-0,05%	0,05%	0,41%	0,10%	-1,82%	-0,52%	-4,84%
Day 19	0,16%	0,10%	-0,17%	0,25%	0,13%	-1,69%	-1,24%	-6,08%
Day 20	-0,07%	0,03%	-0,08%	0,17%	0,13%	-1,55%	-0,08%	-6,16%

Appendix 4a– Combined CAARs during Event Window by Company Industry

Combined	Basic Materials and Oil & Gas		Consumer Goods		Consumer Services		Financials	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	0,00%	0,00%	-0,21%	-0,21%	-0,42%	-0,42%	-0,02%	-0,02%
Day -19	-0,42%	-0,42%	-0,20%	-0,41%	0,03%	-0,39%	-0,21%	-0,24%
Day -18	-0,17%	-0,59%	-0,55%	-0,96%	0,05%	-0,34%	0,11%	-0,13%
Day -17	0,63%	0,04%	0,11%	-0,85%	-0,02%	-0,36%	-0,11%	-0,24%
Day -16	-0,09%	-0,05%	1,30%	0,45%	-0,22%	-0,58%	-0,06%	-0,30%
Day -15	0,06%	0,01%	0,12%	0,57%	-0,20%	-0,78%	0,24%	-0,06%
Day -14	-0,34%	-0,32%	0,45%	1,02%	0,24%	-0,54%	-0,02%	-0,08%
Day -13	-0,10%	-0,42%	-1,27%	-0,25%	0,24%	-0,30%	-0,10%	-0,18%
Day -12	0,08%	-0,34%	0,08%	-0,17%	-0,36%	-0,66%	-0,01%	-0,19%
Day -11	-0,25%	-0,59%	0,49%	0,32%	-0,27%	-0,93%	-0,08%	-0,27%
Day -10	-0,29%	-0,88%	1,52%	1,84%	0,01%	-0,92%	0,05%	-0,22%
Day -9	-0,68%	-1,56%	-1,35%	0,49%	-0,24%	-1,15%	0,07%	-0,15%
Day -8	-0,11%	-1,67%	0,53%	1,02%	0,24%	-0,91%	-0,40%	-0,55%
Day -7	-0,27%	-1,94%	-0,50%	0,52%	-0,37%	-1,28%	0,14%	-0,41%
Day -6	-0,63%	-2,57%	-0,58%	-0,06%	0,12%	-1,15%	0,22%	-0,19%
Day -5	-1,17%	-3,74%	0,08%	0,02%	-0,10%	-1,26%	-0,22%	-0,41%
Day -4	-0,39%	-4,13%	-0,29%	-0,27%	0,00%	-1,25%	-0,31%	-0,72%
Day -3	-0,62%	-4,75%	-0,15%	-0,42%	-0,25%	-1,50%	-0,62%	-1,34%
Day -2	-0,45%	-5,20%	-0,07%	-0,49%	-0,84%	-2,35%	-0,28%	-1,63%
Day -1	0,19%	-5,01%	0,63%	0,14%	0,02%	-2,32%	0,03%	-1,60%
Day -0	0,96%	-4,04%	0,67%	0,81%	-0,03%	-2,36%	0,36%	-1,24%
Day 1	-0,04%	-4,09%	0,35%	1,16%	0,27%	-2,09%	0,11%	-1,13%
Day 2	-0,46%	-4,55%	-0,17%	0,99%	0,37%	-1,71%	-0,43%	-1,57%
Day 3	0,41%	-4,13%	0,00%	1,00%	0,21%	-1,51%	0,28%	-1,29%
Day 4	0,21%	-3,92%	0,20%	1,19%	0,17%	-1,33%	0,31%	-0,98%
Day 5	0,79%	-3,13%	-0,35%	0,84%	0,17%	-1,17%	0,09%	-0,89%
Day 6	0,16%	-2,97%	0,08%	0,92%	-0,16%	-1,33%	0,21%	-0,68%
Day 7	0,13%	-2,83%	-1,68%	-0,76%	0,70%	-0,63%	-0,20%	-0,88%
Day 8	0,09%	-2,74%	0,25%	-0,51%	-0,27%	-0,90%	-0,29%	-1,16%
Day 9	0,08%	-2,66%	-0,27%	-0,78%	0,02%	-0,89%	0,16%	-1,00%
Day 10	0,05%	-2,62%	0,13%	-0,65%	-0,02%	-0,91%	0,02%	-0,98%
Day 11	1,11%	-1,50%	-0,77%	-1,42%	-0,12%	-1,03%	-0,14%	-1,12%
Day 12	-0,13%	-1,63%	-0,89%	-2,30%	-0,01%	-1,04%	0,09%	-1,03%
Day 13	0,99%	-0,64%	0,56%	-1,74%	0,09%	-0,95%	-0,18%	-1,21%
Day 14	-0,07%	-0,71%	0,49%	-1,25%	0,15%	-0,80%	0,26%	-0,95%
Day 15	-0,11%	-0,82%	0,75%	-0,50%	-0,26%	-1,06%	0,15%	-0,81%
Day 16	0,06%	-0,75%	0,51%	0,01%	0,04%	-1,01%	-0,24%	-1,05%
Day 17	-0,05%	-0,80%	0,49%	0,50%	0,35%	-0,66%	-0,02%	-1,07%
Day 18	-0,52%	-1,32%	-0,29%	0,22%	0,23%	-0,43%	0,34%	-0,73%
Day 19	0,15%	-1,18%	0,38%	0,60%	0,25%	-0,18%	-0,21%	-0,94%
Day 20	0,07%	-1,11%	-0,93%	-0,34%	0,35%	0,16%	0,01%	-0,93%

Appendix 4a continued– Combined CAARs during Event Window by Company Industry

Combined	Industrials		Health Care		Technology and Telecommunications	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,14%	-0,14%	0,62%	0,62%	-1,06%	-1,06%
Day -19	-0,28%	-0,42%	-0,53%	0,10%	-0,11%	-1,16%
Day -18	0,13%	-0,29%	0,09%	0,19%	0,04%	-1,13%
Day -17	-0,20%	-0,49%	-0,95%	-0,76%	0,63%	-0,50%
Day -16	0,04%	-0,44%	-0,48%	-1,24%	-0,79%	-1,29%
Day -15	-0,16%	-0,60%	-0,63%	-1,87%	-0,67%	-1,95%
Day -14	0,08%	-0,52%	-0,19%	-2,06%	-0,33%	-2,28%
Day -13	0,26%	-0,27%	0,25%	-1,81%	-1,06%	-3,34%
Day -12	-0,36%	-0,63%	-0,77%	-2,58%	-0,28%	-3,62%
Day -11	0,05%	-0,58%	0,26%	-2,32%	0,75%	-2,87%
Day -10	0,06%	-0,51%	-0,12%	-2,43%	0,33%	-2,54%
Day -9	-0,19%	-0,71%	0,02%	-2,41%	-0,34%	-2,88%
Day -8	-0,32%	-1,03%	-0,52%	-2,94%	-0,27%	-3,15%
Day -7	0,00%	-1,03%	-0,80%	-3,74%	-0,75%	-3,89%
Day -6	-0,25%	-1,28%	0,38%	-3,36%	-0,03%	-3,92%
Day -5	-0,14%	-1,42%	-0,36%	-3,72%	-0,68%	-4,60%
Day -4	0,00%	-1,41%	0,22%	-3,49%	-0,59%	-5,19%
Day -3	0,11%	-1,30%	0,20%	-3,29%	0,04%	-5,15%
Day -2	0,02%	-1,28%	-0,59%	-3,88%	0,01%	-5,14%
Day -1	0,03%	-1,25%	0,20%	-3,69%	0,69%	-4,45%
Day -0	0,85%	-0,40%	0,53%	-3,16%	-0,33%	-4,78%
Day 1	-0,02%	-0,42%	0,34%	-2,81%	0,26%	-4,53%
Day 2	0,39%	-0,03%	-0,18%	-3,00%	0,65%	-3,88%
Day 3	0,18%	0,15%	0,36%	-2,64%	-0,72%	-4,60%
Day 4	0,59%	0,75%	-0,11%	-2,75%	0,98%	-3,62%
Day 5	-0,22%	0,53%	0,13%	-2,62%	0,04%	-3,58%
Day 6	0,33%	0,86%	0,06%	-2,57%	0,13%	-3,45%
Day 7	-0,11%	0,75%	-0,04%	-2,60%	0,32%	-3,13%
Day 8	0,52%	1,26%	0,25%	-2,35%	-0,42%	-3,56%
Day 9	0,10%	1,36%	-0,57%	-2,93%	-0,17%	-3,73%
Day 10	0,05%	1,41%	0,50%	-2,42%	0,47%	-3,26%
Day 11	-0,06%	1,35%	0,02%	-2,40%	-0,88%	-4,14%
Day 12	0,01%	1,37%	0,20%	-2,21%	0,19%	-3,95%
Day 13	-0,29%	1,08%	-0,24%	-2,45%	0,43%	-3,52%
Day 14	0,34%	1,42%	0,16%	-2,28%	0,06%	-3,46%
Day 15	0,23%	1,65%	-0,08%	-2,37%	0,00%	-3,46%
Day 16	-0,20%	1,45%	-0,35%	-2,71%	0,09%	-3,37%
Day 17	-0,24%	1,21%	0,41%	-2,30%	-0,59%	-3,96%
Day 18	-0,18%	1,03%	-0,41%	-2,72%	0,10%	-3,85%
Day 19	0,43%	1,46%	-0,44%	-3,16%	0,23%	-3,63%
Day 20	-0,03%	1,42%	0,39%	-2,77%	-0,67%	-4,30%

Appendix 4b– Purchase CAARs during Event Window by Company Industry

Purchases	Basic Materials and Oil & Gas		Consumer Goods		Consumer Services		Financials	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,53%	-0,53%	-0,55%	-0,55%	-0,28%	-0,28%	-0,01%	-0,01%
Day -19	-0,03%	-0,56%	0,26%	-0,29%	0,02%	-0,26%	-0,16%	-0,17%
Day -18	-0,08%	-0,64%	-0,04%	-0,33%	0,03%	-0,23%	0,13%	-0,04%
Day -17	0,71%	0,07%	0,28%	-0,05%	-0,15%	-0,38%	0,05%	0,01%
Day -16	-0,04%	0,03%	0,47%	0,42%	-0,03%	-0,41%	-0,02%	-0,01%
Day -15	-0,10%	-0,07%	-0,18%	0,25%	-0,18%	-0,59%	0,22%	0,21%
Day -14	-0,48%	-0,55%	0,20%	0,44%	-0,05%	-0,63%	-0,07%	0,15%
Day -13	-0,37%	-0,92%	-0,56%	-0,12%	0,19%	-0,45%	0,04%	0,19%
Day -12	0,20%	-0,72%	-0,14%	-0,26%	-0,16%	-0,61%	0,04%	0,23%
Day -11	-0,20%	-0,91%	0,52%	0,26%	-0,24%	-0,85%	-0,16%	0,06%
Day -10	-0,29%	-1,20%	1,30%	1,56%	-0,01%	-0,86%	0,01%	0,08%
Day -9	-0,20%	-1,40%	-1,06%	0,50%	-0,11%	-0,98%	-0,01%	0,06%
Day -8	-0,11%	-1,52%	0,17%	0,67%	0,11%	-0,86%	-0,24%	-0,18%
Day -7	0,31%	-1,21%	-0,52%	0,16%	-0,14%	-1,00%	0,07%	-0,11%
Day -6	0,20%	-1,00%	-0,31%	-0,16%	-0,01%	-1,01%	0,03%	-0,08%
Day -5	-1,20%	-2,21%	0,14%	-0,02%	-0,15%	-1,16%	-0,15%	-0,24%
Day -4	-0,25%	-2,46%	-0,02%	-0,05%	0,18%	-0,98%	-0,09%	-0,32%
Day -3	-0,39%	-2,85%	0,09%	0,05%	0,02%	-0,96%	-0,46%	-0,78%
Day -2	-0,53%	-3,38%	0,01%	0,06%	-0,56%	-1,52%	-0,27%	-1,05%
Day -1	-0,05%	-3,44%	0,42%	0,48%	0,03%	-1,49%	0,04%	-1,01%
Day -0	0,97%	-2,47%	0,57%	1,06%	0,13%	-1,35%	0,34%	-0,67%
Day 1	0,11%	-2,36%	0,04%	1,10%	0,18%	-1,17%	-0,02%	-0,69%
Day 2	-0,11%	-2,47%	-0,04%	1,06%	0,20%	-0,97%	-0,28%	-0,98%
Day 3	0,66%	-1,81%	-0,53%	0,53%	0,08%	-0,89%	0,19%	-0,79%
Day 4	0,43%	-1,38%	0,08%	0,61%	0,10%	-0,79%	0,14%	-0,65%
Day 5	0,73%	-0,65%	0,05%	0,66%	0,06%	-0,73%	0,01%	-0,64%
Day 6	-0,04%	-0,69%	-0,30%	0,36%	-0,08%	-0,81%	0,14%	-0,50%
Day 7	0,10%	-0,59%	-1,32%	-0,96%	0,56%	-0,25%	-0,06%	-0,56%
Day 8	-0,35%	-0,95%	0,14%	-0,82%	-0,31%	-0,56%	-0,14%	-0,70%
Day 9	0,31%	-0,64%	0,08%	-0,74%	0,07%	-0,48%	0,12%	-0,57%
Day 10	-0,11%	-0,75%	0,03%	-0,72%	-0,13%	-0,61%	0,03%	-0,54%
Day 11	0,83%	0,08%	-0,47%	-1,18%	-0,08%	-0,70%	0,00%	-0,55%
Day 12	-0,27%	-0,18%	-0,14%	-1,32%	0,16%	-0,53%	0,12%	-0,43%
Day 13	0,71%	0,53%	-0,02%	-1,34%	-0,08%	-0,61%	-0,07%	-0,50%
Day 14	-0,33%	0,20%	-0,02%	-1,36%	0,12%	-0,49%	-0,02%	-0,52%
Day 15	-0,23%	-0,03%	1,10%	-0,25%	-0,38%	-0,87%	-0,11%	-0,63%
Day 16	-0,20%	-0,23%	-0,55%	-0,81%	0,08%	-0,78%	-0,11%	-0,74%
Day 17	0,23%	0,00%	0,61%	-0,19%	0,11%	-0,67%	-0,04%	-0,78%
Day 18	-0,41%	-0,40%	-0,24%	-0,43%	-0,02%	-0,69%	0,11%	-0,67%
Day 19	0,28%	-0,13%	0,41%	-0,02%	0,28%	-0,41%	-0,18%	-0,86%
Day 20	-0,06%	-0,18%	-0,70%	-0,72%	0,21%	-0,20%	0,07%	-0,79%

Appendix 4b continued– Purchase CAARs during Event Window by Company Industry

Purchase	Industrials		Health Care		Technology and Telecommunications	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,41%	-0,41%	0,37%	0,37%	-0,58%	-0,58%
Day -19	-0,46%	-0,87%	-0,37%	0,00%	0,15%	-0,42%
Day -18	0,04%	-0,82%	0,12%	0,12%	-0,03%	-0,45%
Day -17	-0,29%	-1,11%	-0,61%	-0,49%	0,46%	0,00%
Day -16	-0,12%	-1,23%	-0,24%	-0,73%	-0,29%	-0,29%
Day -15	-0,03%	-1,26%	-0,15%	-0,88%	-0,57%	-0,86%
Day -14	0,08%	-1,17%	0,08%	-0,80%	-0,14%	-1,00%
Day -13	-0,14%	-1,32%	0,16%	-0,64%	-0,16%	-1,16%
Day -12	-0,31%	-1,63%	-0,72%	-1,37%	-0,18%	-1,34%
Day -11	0,06%	-1,57%	0,21%	-1,15%	0,71%	-0,62%
Day -10	-0,02%	-1,59%	0,03%	-1,13%	-0,03%	-0,65%
Day -9	-0,31%	-1,90%	-0,11%	-1,24%	0,05%	-0,60%
Day -8	-0,18%	-2,07%	-0,70%	-1,94%	-0,26%	-0,86%
Day -7	0,17%	-1,90%	-0,64%	-2,58%	-0,32%	-1,18%
Day -6	-0,44%	-2,35%	0,03%	-2,55%	0,09%	-1,09%
Day -5	-0,27%	-2,62%	-0,50%	-3,05%	-0,74%	-1,83%
Day -4	0,02%	-2,60%	0,30%	-2,75%	-0,18%	-2,01%
Day -3	0,15%	-2,44%	0,16%	-2,59%	-0,03%	-2,04%
Day -2	-0,05%	-2,49%	-0,43%	-3,02%	-0,07%	-2,11%
Day -1	0,35%	-2,14%	-0,18%	-3,20%	0,63%	-1,48%
Day -0	0,52%	-1,63%	0,30%	-2,90%	-0,28%	-1,76%
Day 1	-0,13%	-1,75%	0,25%	-2,65%	0,48%	-1,28%
Day 2	0,39%	-1,36%	-0,01%	-2,67%	0,24%	-1,05%
Day 3	0,13%	-1,23%	0,22%	-2,44%	-0,63%	-1,68%
Day 4	0,28%	-0,95%	-0,13%	-2,58%	0,49%	-1,19%
Day 5	-0,15%	-1,10%	0,03%	-2,55%	-0,37%	-1,56%
Day 6	0,34%	-0,76%	0,06%	-2,48%	-0,10%	-1,66%
Day 7	-0,10%	-0,86%	-0,19%	-2,67%	0,13%	-1,53%
Day 8	0,09%	-0,77%	0,50%	-2,17%	-0,86%	-2,39%
Day 9	0,12%	-0,65%	-0,33%	-2,50%	0,33%	-2,06%
Day 10	-0,31%	-0,96%	0,16%	-2,35%	0,51%	-1,55%
Day 11	-0,08%	-1,05%	-0,20%	-2,54%	-0,27%	-1,82%
Day 12	0,09%	-0,95%	0,06%	-2,49%	0,39%	-1,44%
Day 13	-0,37%	-1,32%	-0,32%	-2,81%	0,24%	-1,19%
Day 14	0,11%	-1,22%	0,26%	-2,55%	-0,27%	-1,47%
Day 15	0,12%	-1,09%	-0,39%	-2,94%	0,37%	-1,10%
Day 16	-0,32%	-1,41%	-0,28%	-3,22%	-0,31%	-1,41%
Day 17	-0,14%	-1,55%	0,20%	-3,03%	-0,59%	-2,00%
Day 18	0,00%	-1,54%	0,29%	-2,74%	0,36%	-1,64%
Day 19	0,06%	-1,49%	-0,37%	-3,11%	-0,03%	-1,67%
Day 20	-0,01%	-1,49%	0,09%	-3,02%	-0,80%	-2,47%

Appendix 4c- Sale CAARs during Event Window by Company Industry

Sales	Basic Materials and Oil & Gas		Consumer Goods		Consumer Services		Financials	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,53%	-0,53%	-0,34%	-0,34%	-0,42%	-0,42%	0,02%	0,02%
Day -19	0,39%	-0,14%	0,47%	0,12%	0,03%	-0,39%	0,05%	0,07%
Day -18	0,09%	-0,05%	0,51%	0,63%	0,05%	-0,34%	0,02%	0,09%
Day -17	0,09%	0,03%	0,17%	0,80%	-0,02%	-0,36%	0,16%	0,25%
Day -16	0,05%	0,08%	-0,82%	-0,02%	-0,22%	-0,58%	0,04%	0,29%
Day -15	-0,16%	-0,08%	-0,30%	-0,32%	-0,20%	-0,78%	-0,02%	0,28%
Day -14	-0,15%	-0,23%	-0,26%	-0,58%	0,24%	-0,54%	-0,05%	0,23%
Day -13	-0,27%	-0,50%	0,71%	0,13%	0,24%	-0,30%	0,14%	0,37%
Day -12	0,13%	-0,37%	-0,22%	-0,09%	-0,36%	-0,66%	0,05%	0,42%
Day -11	0,05%	-0,32%	0,03%	-0,06%	-0,27%	-0,93%	-0,08%	0,33%
Day -10	0,00%	-0,33%	-0,22%	-0,28%	0,01%	-0,92%	-0,04%	0,30%
Day -9	0,48%	0,15%	0,29%	0,01%	-0,24%	-1,15%	-0,08%	0,22%
Day -8	0,00%	0,15%	-0,36%	-0,35%	0,24%	-0,91%	0,16%	0,37%
Day -7	0,58%	0,74%	-0,01%	-0,36%	-0,37%	-1,28%	-0,08%	0,30%
Day -6	0,83%	1,57%	0,26%	-0,10%	0,12%	-1,15%	-0,19%	0,11%
Day -5	-0,03%	1,53%	0,05%	-0,04%	-0,10%	-1,26%	0,07%	0,17%
Day -4	0,14%	1,67%	0,27%	0,23%	0,00%	-1,25%	0,23%	0,40%
Day -3	0,23%	1,90%	0,25%	0,47%	-0,25%	-1,50%	0,16%	0,56%
Day -2	-0,09%	1,81%	0,08%	0,55%	-0,84%	-2,35%	0,01%	0,57%
Day -1	-0,25%	1,57%	-0,21%	0,34%	0,02%	-2,32%	0,01%	0,59%
Day -0	0,01%	1,57%	-0,10%	0,25%	-0,03%	-2,36%	-0,02%	0,57%
Day 1	0,15%	1,73%	-0,31%	-0,07%	0,27%	-2,09%	-0,12%	0,44%
Day 2	0,35%	2,08%	0,13%	0,07%	0,37%	-1,71%	0,15%	0,59%
Day 3	0,24%	2,32%	-0,53%	-0,46%	0,21%	-1,51%	-0,09%	0,50%
Day 4	0,22%	2,54%	-0,12%	-0,58%	0,17%	-1,33%	-0,18%	0,32%
Day 5	-0,06%	2,48%	0,40%	-0,18%	0,17%	-1,17%	-0,08%	0,24%
Day 6	-0,20%	2,28%	-0,38%	-0,56%	-0,16%	-1,33%	-0,07%	0,17%
Day 7	-0,04%	2,24%	0,36%	-0,20%	0,70%	-0,63%	0,14%	0,32%
Day 8	-0,44%	1,80%	-0,12%	-0,32%	-0,27%	-0,90%	0,15%	0,46%
Day 9	0,23%	2,02%	0,35%	0,03%	0,02%	-0,89%	-0,04%	0,43%
Day 10	-0,15%	1,87%	-0,10%	-0,07%	-0,02%	-0,91%	0,01%	0,43%
Day 11	-0,28%	1,59%	0,30%	0,23%	-0,12%	-1,03%	0,13%	0,57%
Day 12	-0,14%	1,45%	0,75%	0,98%	-0,01%	-1,04%	0,03%	0,60%
Day 13	-0,28%	1,17%	-0,58%	0,41%	0,09%	-0,95%	0,11%	0,71%
Day 14	-0,26%	0,91%	-0,51%	-0,11%	0,15%	-0,80%	-0,28%	0,43%
Day 15	-0,12%	0,79%	0,35%	0,25%	-0,26%	-1,06%	-0,25%	0,18%
Day 16	-0,26%	0,52%	-1,07%	-0,82%	0,04%	-1,01%	0,13%	0,31%
Day 17	0,28%	0,80%	0,12%	-0,70%	0,35%	-0,66%	-0,02%	0,29%
Day 18	0,12%	0,92%	0,05%	-0,65%	0,23%	-0,43%	-0,23%	0,06%
Day 19	0,13%	1,05%	0,03%	-0,62%	0,25%	-0,18%	0,03%	0,09%
Day 20	-0,13%	0,92%	0,23%	-0,39%	0,35%	0,16%	0,06%	0,15%

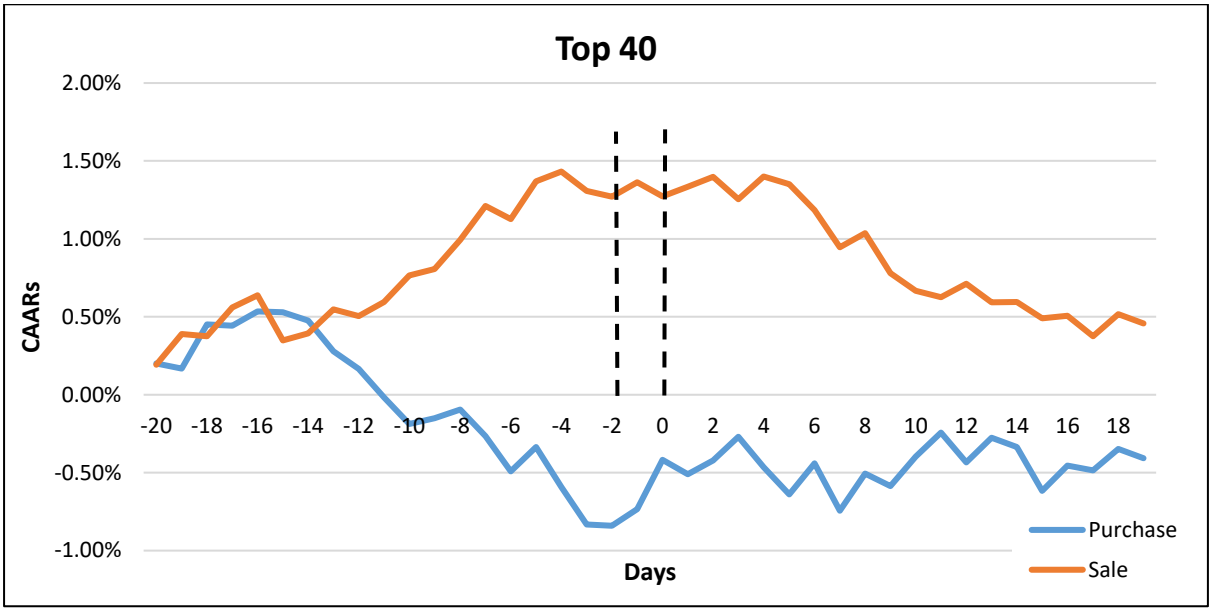
Appendix 4c continued– Sale CAARs during Event Window by Company Industry

Sale	Industrials		Health Care		Technology and Telecommunications	
	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)	AARs (%)	CAAR(%)
Day -20	-0,26%	-0,26%	-0,26%	-0,26%	0,48%	0,48%
Day -19	-0,18%	-0,44%	0,15%	-0,10%	0,26%	0,74%
Day -18	-0,09%	-0,53%	0,03%	-0,07%	-0,07%	0,68%
Day -17	-0,09%	-0,62%	0,34%	0,27%	-0,17%	0,50%
Day -16	-0,16%	-0,78%	0,24%	0,51%	0,50%	1,00%
Day -15	0,13%	-0,65%	0,48%	0,99%	0,10%	1,10%
Day -14	0,00%	-0,65%	0,27%	1,26%	0,19%	1,28%
Day -13	-0,40%	-1,05%	-0,09%	1,17%	0,90%	2,18%
Day -12	0,05%	-1,00%	0,05%	1,21%	0,10%	2,28%
Day -11	0,00%	-1,00%	-0,05%	1,16%	-0,03%	2,25%
Day -10	-0,08%	-1,08%	0,14%	1,30%	-0,36%	1,89%
Day -9	-0,12%	-1,19%	-0,13%	1,18%	0,39%	2,28%
Day -8	0,15%	-1,05%	-0,18%	1,00%	0,01%	2,29%
Day -7	0,17%	-0,87%	0,15%	1,15%	0,43%	2,72%
Day -6	-0,19%	-1,07%	-0,34%	0,81%	0,12%	2,83%
Day -5	-0,14%	-1,20%	-0,15%	0,67%	-0,06%	2,77%
Day -4	0,02%	-1,19%	0,07%	0,74%	0,40%	3,18%
Day -3	0,04%	-1,15%	-0,04%	0,70%	-0,07%	3,11%
Day -2	-0,07%	-1,21%	0,16%	0,86%	-0,08%	3,03%
Day -1	0,32%	-0,89%	-0,37%	0,49%	-0,06%	2,98%
Day -0	-0,33%	-1,22%	-0,23%	0,26%	0,05%	3,02%
Day 1	-0,11%	-1,33%	-0,10%	0,16%	0,22%	3,24%
Day 2	0,00%	-1,33%	0,17%	0,33%	-0,41%	2,83%
Day 3	-0,05%	-1,38%	-0,14%	0,20%	0,09%	2,92%
Day 4	-0,32%	-1,70%	-0,02%	0,17%	-0,49%	2,42%
Day 5	0,07%	-1,63%	-0,09%	0,08%	-0,40%	2,02%
Day 6	0,01%	-1,62%	0,01%	0,08%	-0,23%	1,79%
Day 7	0,01%	-1,61%	-0,15%	-0,07%	-0,19%	1,60%
Day 8	-0,43%	-2,04%	0,25%	0,18%	-0,44%	1,16%
Day 9	0,02%	-2,02%	0,24%	0,42%	0,51%	1,67%
Day 10	-0,36%	-2,37%	-0,35%	0,07%	0,04%	1,71%
Day 11	-0,03%	-2,40%	-0,22%	-0,14%	0,60%	2,31%
Day 12	0,08%	-2,32%	-0,14%	-0,28%	0,20%	2,51%
Day 13	-0,08%	-2,40%	-0,08%	-0,37%	-0,18%	2,33%
Day 14	-0,23%	-2,64%	0,10%	-0,27%	-0,34%	1,99%
Day 15	-0,11%	-2,74%	-0,31%	-0,57%	0,37%	2,37%
Day 16	-0,12%	-2,86%	0,06%	-0,51%	-0,41%	1,96%
Day 17	0,11%	-2,75%	-0,22%	-0,73%	0,00%	1,96%
Day 18	0,18%	-2,57%	0,70%	-0,02%	0,25%	2,21%
Day 19	-0,37%	-2,94%	0,07%	0,05%	-0,26%	1,95%
Day 20	0,03%	-2,92%	-0,30%	-0,25%	-0,13%	1,82%

Appendix 5- Index Specific Market Proxy

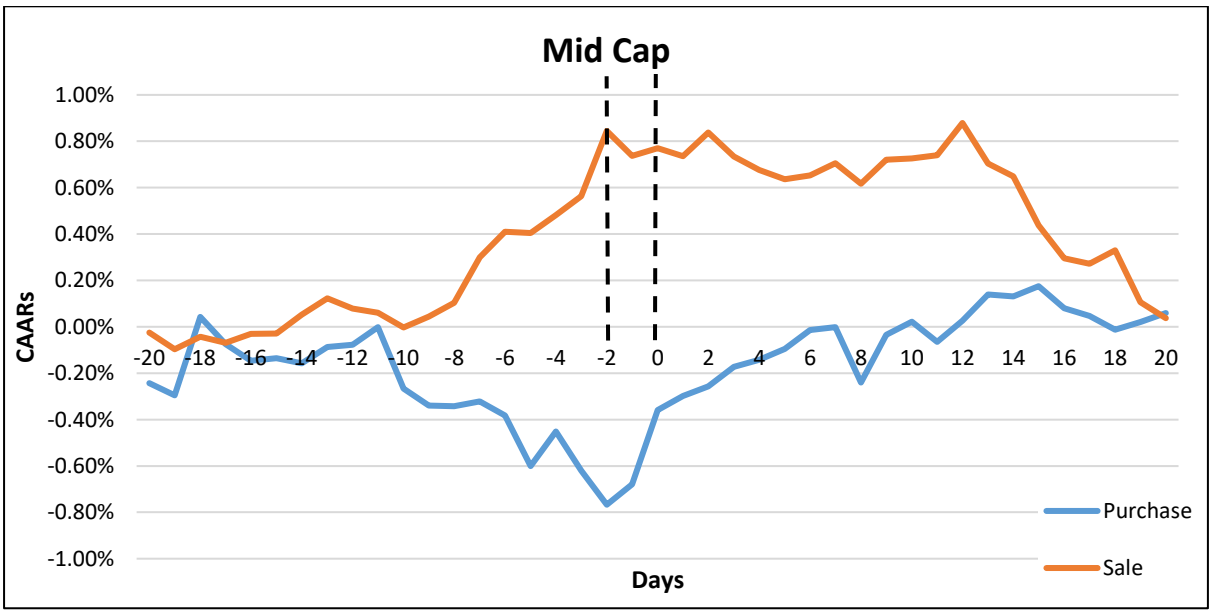
a) Top 40 (J200)

Figure 21- Sales & Purchases CAAR's for Top 40 firms – J200 Market Proxy



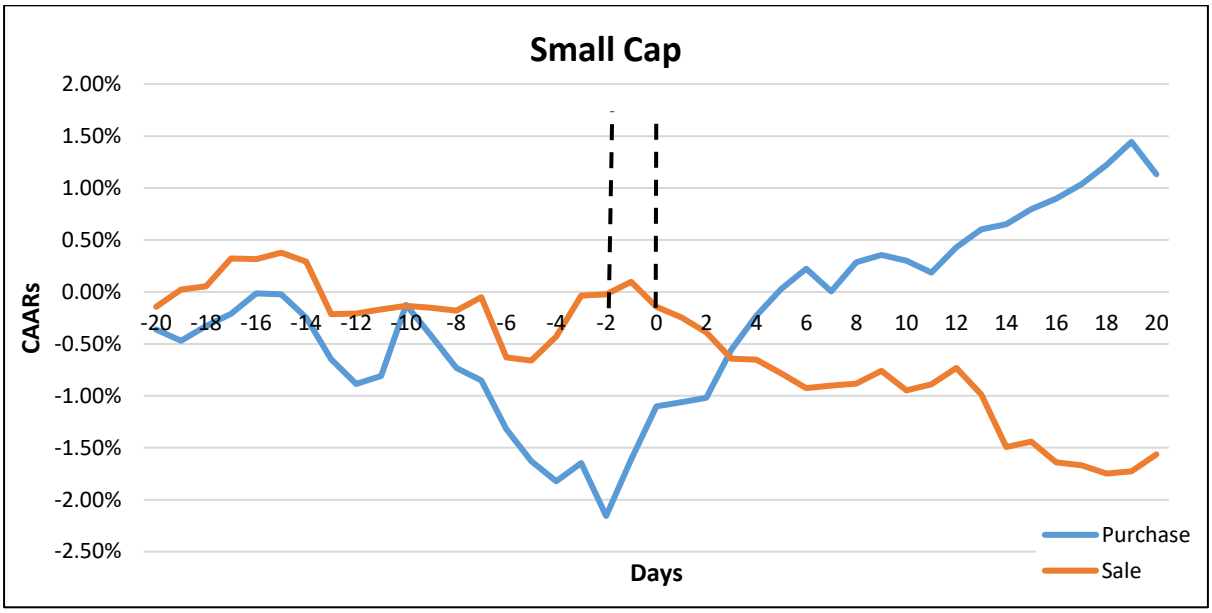
b) Mid Cap (J201)

Figure 22- Sales & Purchases CAAR's for Mid Cap firms – J201 Market Proxy



c) Small Cap (J202)

Figure 23- Sales & Purchases CAAR's for Small Cap firms – J202 Market Proxy



d) Fledgling (J204)

Figure 24- Sales & Purchases CAAR's for Fledgling firms – J204 Market Proxy